PROCEEDINGS

OF THE

Boston Society of Natural History.

VOL. VII.

1859 TO 1861.

BOSTON:

PRINTED FOR THE SOCIETY.

1861.

PUBLISHING COMMITTEE.

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RIVERSIDE, CAMBRIDGE:
PRINTED BY H. O. HOUGHTON.

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BOSTON SOCIETY OF NATURAL HISTORY.

TAKEN FROM THE SOCIETY'S RECORDS.

January 5, 1859.

T. J. Whittemore, Esq., in the Chair.

Mr. F. H. Storer read a paper on the power possessed by the larvæ of various common flies, of consuming, without apparent injury to themselves, the flesh of animals which have died from the effects of arsenic.

Last June he found several larvæ upon the liver of a subject in whose stomach he had previously detected the presence of arsenic; this liver was found on analysis to be saturated with arsenic. In order to determine if the larvæ were actually nourished by such poisonous flesh, the bodies of several rats killed by arsenious acid were exposed to the flies; in forty-eight hours they were completely fly-blown, and in a week all the flesh had been consumed by the larvæ; after this they changed into chrysalids. These chrysalids on analysis yielded metallic arsenic. It might be supposed that the arsenic, thus obtained, had been attracted mechanically to the external surface of the larvæ, and had not been swallowed, especially as the denuded bones were covered with a white powder resembling arsenic—however this may be, the larvæ must either instinctively reject the poison, or it is excreted by them after ingestion. A number of these chrysalids were kept, in order to ascertain if they would undergo metamorphosis, and, if so, whether the perfect insects would be healthy and vigorous; some were kept two months, at the end of which time they were accidentally lost, undergoing no change, remaining however in a perfect state of preservation and full of pulp; a number of small flies, apparently not ichneumons, which gained access to them, died almost immediately, as was supposed from having fed upon them—the empty shells of other chrysalids found about the room showed that some had been metamorphosed, as none but the arsenically-fed larvæ had been admitted to the apartment. Experiments made to determine how large a quantity of arsenic might be contained in flesh without rendering it unfit for the food of these larvæ, were not very satisfactory, from the hardening of the tissue by solutions of this substance preventing the deposition of the eggs; eggs developed in such tissue bring forth living worms, which in his experiments died in six or eight hours. The adult flies perished in great numbers, while depositing the eggs upon the poisoned flesh. Jaeger (quoted by Orfila, Toxicologie I. 379) alludes to the fact that larvæ of flies live a little longer than the perfect insects, when arsenious acid is introduced into the digestive organs or applied to their external soft parts. Under favorable moist conditions, the larvæ lived three or four days, and were evidently nearly ready to pass into the chrysalid state. Experiments with arsenic acid, used however in too concentrated a state, also showed that there is a limit to the amount of arsenic which these larvæ can support.

He was inclined to believe that they can eat with impunity any flesh into which arsenic has been carried by vital processes, from the fact of their being found upon the arsenicated liver, an organ capable of absorbing a very large quantity of this poison; anatomical preparations, injected thoroughly with arsenic acid, have been found completely riddled and alive with larvæ.

This matter is important to chemists occupied in judicial investigations, who should not infer that a fly-blown organ can contain no arsenic; though if flies die almost immediately after alighting on a suspected substance, arsenic is probably present, and should be specially sought for. These facts are also interesting as showing the great differences which exist in animals in their several conditions of metamorphosis, and as indicating the caution with which the results of experiments on one species should be received as applying to other species. The popular belief that a body, dead from the effects of arsenic, must of necessity be preserved from decay for an indefinite length of time, is unquestionably an error; in many cases of murder or suicide, where a great amount of the poison is administered, portions of or even the whole body may be preserved for a long time; but the few grains, which it is admitted are enough to cause death, cannot preserve from decay so large a mass as a human body. That a small, though fatal, dose will not prevent decomposition, is well known to all who have ever had poisoned rats die in the walls of their houses.

Mr. Putnam exhibited specimens of the young of *Pomotis vulgaris*, *P. appendix*, and *P. rubricauda*, and showed that the specimens presented by Mr. Thoreau, at the last meeting, were not the young of any of these species; but by having teeth on the palatines they were generically distinct, and belonged to the genus *Bryttus* of Valenciennes. He thought that they might prove to be the *Pomotis obesus* of Girard; but owing to the very short description given by Mr. Girard in the 5th volume of the Proceedings of the Society, it will be impossible to decide this question until we have an opportunity of seeing his original specimens. He mentioned that there were specimens of the same species from Philadelphia, at the museum at Cambridge, and that he had also received specimens from several localities near Salem, from Dr. R. H. Wheatland, and that it was very nearly allied to the *Bryttus fasciatus* of Dr. Holbrook. He also exhibited specimens of the young and adult pickerel, to show that the "short-nosed pickerel" is specifically distinct from the "long-nosed"—the *Esox reticulatus*—and said that the "short-nosed" species is the *Esox fasciatus* of Dekay, which is not the young of the *Esox reticulatus*, as Dr. Storer considers it, and that the *Esox ornatus* of Girard, which is adopted by Dr. Storer in his last number of the "Fishes of Massachusetts," is synonymous with the *Esox fasciatus* of Dekay; and therefore Girard's name would have to be dropped, and the name of *Esox fasciatus*, Dekay, would have to be retained for the "short-nosed species." He mentioned that at the Cambridge Museum there are specimens of the "short-nosed species" which are about two feet in length, thus showing that it is not the young of the *E. reticulatus*,—which was also proved by the series of specimens exhibited from the Essex Institute, which showed the same marked differences in the very young as well as in the older specimens. In conclusion he mentioned that our fresh-water fishes are as yet but little known, and that there are in the waters of the United States at least forty-five species of the old genus Pomotis, and ten or fifteen of the genus Esox, of which very few have been described.

Mr. Sprague exhibited specimens of large size, presented by him several years ago, confirming the opinion of Mr. Putnam.

Capt. Atwood presented a specimen of *Naucrates*, or pilot fish, well known to seamen as accompanying their vessels for long distances; this was caught in a mackerel net in Provincetown harbor in October, 1858, and was the first that he had heard of in our waters; a northern whaler had come into the harbor a few days before, and the fish perhaps followed the vessel in. He presented a squid, differing from the *Loligo illecebrosa;* appearing on our coast in June, while the latter does not arrive until August. He also gave some bivalve shells and a *Margarita* from the Gulf of St. Lawrence.

Capt. Atwood stated that fish are often swallowed by the cod, pass from their stomach into the abdominal cavity, and are there found "mummified" and adherent to the inner walls; he presented a specimen, apparently of the eel family, thus preserved and hardened, which he had taken from the abdominal cavity of a pollock. Cod are often so wounded by the hooks that the intestines hang out in the water, and yet such fish are seen swimming about with the rest without apparent suffering, and he had no doubt that they bite at the hooks in a few days. He presented two large cod hooks, with portions of the line attached, which he had taken from the livers of apparently healthy cod; the greater part of the hooks was buried in the organ, and must have remained there, he thought, at least twelve months; they must have been swallowed, broken off, and have worked their way through the stomach into the liver.

Mr. William P. Blake, of New Haven, was chosen a Corresponding Member.

January 19, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Dr. Cabot made a statement respecting the ravages of the larvæ of *Dermestes* and *Anthreni* in specimens of birds supposed to be sufficiently protected; the former, he said, attack the skin, the latter the legs and bill. Specimens dipped in a very strong solution of corrosive sublimate, and in a saturated solution of arsenious acid in hot water, were attacked by these larvæ; but specimens dipped into a tincture of strychnine were not touched by them. Of the first two poisons, arsenic is the best; in specimens preserved by the latter the skin was not touched, the larvæ boring in through the legs.

Dr. C. T. Jackson made some observations on the preservation of animal tissues by arsenic; he mentioned a case in which the stomach, carefully washed, had at first assumed a yellowish tint, becoming soft, with an odor of ammonia, but none of sulphuretted hydrogen, then changing into a pasty mass of a custard yellow, and finally of the magnificent red of the sulphuret of arsenic, the sulphur having been obtained from the decomposition of the tissues. In another case, where the amount of the poison was greater, the abdominal organs were perfectly preserved, and the walls shrivelled.

The Secretary read a paper from Dr. Henry Bryant on some of the birds observed by him in East Florida, south of St. Augustine, as follows:—

Cathartes aura. The Turkey Buzzards were much more numerous at Enterprise than the Black Vultures; at Indian River the vultures were the most common; and among the keys both species were rare. Audubon, in his description of this bird, states that the naked skin about the head is frequently diseased in old individuals. I have often observed this part of the bird, as well as the tarsi, to be covered with warts and excrescences; several specimens that I dissected had the lymphatic glands of the neck much enlarged; one had an exostosis of the posterior extremity of the crest of the sternum, and another a disease of the liver resembling the commencement of cirrhosis.

Polyborus vulgaris. I saw two pairs of Caracara Eagles, one at Indian River on the 15th of March, and the other at Enterprise on the 20th of April. The pair at Indian River were attracted to the place by the offal of the animals slaughtered for the troops stationed there; they were frightened away by the discharge of a gun, and did not to my knowledge return again. The pair at Enterprise, when first seen, were perched on a tree not a hundred yards from the house, in company with a number of Turkey Buzzards. During an hour that I watched them they remained in the same place, occasionally opening their wings, but otherwise motionless, though the buzzards were continually flying to and from an alligator dead on the edge of the lake. They did not seem at all wild, and were apparently on perfectly good terms with the buzzards, not assuming any superiority over them, and allowing them to alight on the same branch with themselves. On shooting one of them, which proved to be a male, the other flew off and did not return till the following day, when it was also shot; this was a female. The male appeared to be in perfectly adult plumage; the female had just commenced changing the plumage of the young bird for that of the adult, showing merely a few scattered feathers of the adult livery. The ovaries of the female showed that she had laid eggs that season. The crops of both birds were empty, and the stomachs filled with a pultaceous mass of putrid animal matter. On comparing them with three South American specimens, I find that the number of the transverse scales of the tarsi and feet vary in a most remarkable manner in the different specimens. One of the South American specimens has the whole front of one tarsus covered with transverse scales, fourteen in number, while there are only seven on the other; these are however separated in two places by hexagonal scales, so that some of the transverse scales are near the head of the tarsus. In a second specimen there are six on one tarsus and four on the other, and in the third, five on each tarsus. In the Florida specimens, one has four on each tarsus; and the second has four on one and five on the other. The transverse scales on the hind toe present the same irregularity; one bird having four on each toe, a second four on one toe and five on the other, a third four on one and three on the other, a fourth five on one and six on the other, and the fifth five on each. Audubon, in his description, states that the lateral toes are equal,[1] and that the base of the inner toe is scaly, by which I suppose he means that it is covered with small scales. In my specimen the outer toe is considerably longer than the inner, and the distribution of the scales the same on both outer and inner toes. The following measurements in millimetres were carefully taken from the recent specimens:—

	♂	♀
Length	600	600
Extent	1230	1270
Wing from flexure	410	430
Length of tail	210	215
Tarsus	98	99
Middle toe	54	56
Middle toe-nail	26	29
Hind toe	25	25
Hind toe-nail	29	29
Outer toe	42	46
Outer toe-nail	23	23
Inner toe	35	37
Inner toe-nail	29	29
[2] Bill along ridge	38	39
Gape to tip of L. mandible	45½	49
[3] Depth of bill	22	24
[3] Breadth of bill	15	14
Length of nostril	6	6
Breadth of nostril	2	2
Difference in length of tail feathers	30	20

1 Gray, in his genera, says the inner toe is longer than the outer.

2 From cere.

3 At edge of cere.

Buteo lineatus. The most common hawk except the Fish Hawk at Enterprise; abundant everywhere on the St. Johns and Lakes; none seen near the sea-coast; smaller and brighter colored than northern specimens.

Haliaëtus leucocephalus. Very abundant; at Spring-Garden Lake I saw several pairs nesting on the tops of palmetto trees, though there were tall pines in the immediate vicinity.

Nauclerus furcatus. I found this beautiful hawk to be far less abundant than I had expected. I saw none on the sea-coast, and not more than a dozen on the St. Johns.

Ephialtes asio. Near the house I resided in at New Smyrna, there was an old picket fence constructed of palmetto logs; a large number of these had been excavated by the Red-bellied Woodpecker, and in their deserted holes I found three nests of the little Red Owl. In every instance the female was sitting on her eggs, and allowed me to take her in my hand without making any resistance. They were all in full plumage, without any indication of the mottled plumage of the young. Although it would certainly seem a fair inference that the little Red Owl was extremely abundant in that part of Florida, I saw but one other individual during my stay there.

Bubo Virginianus. Near New Smyrna there are three large stone pillars that mark the site of a house burnt by the Indians. They stand near the water, and are entirely exposed to the light of the sun; yet, on the top of one of them, a pair of great Horned Owls had made their nest, and the female could be seen sitting on her eggs in the full blaze of the sun. The top of the pillar not being accessible, on account of its height and ruinous state, I could not examine the nest. Much to my regret, before the young were hatched the parent bird was shot.

Tyrannus Dominicensis. The distribution of this bird is apparently quite irregular; on one small key, not an acre in extent, I have counted four pairs; and on many others, and among them some of the largest, I did not see a single individual. They seemed to prefer what Audubon calls dove keys, which are covered with grass or bushes, and are either skirted round the margin with trees, or else have a few scattered trees here and there. I saw none at the Marquis, none at the Miami, or in the neighborhood of Indian River, but at New Smyrna they were quite abundant, confining themselves, as far as my observation went, entirely to the dead mangroves. These dead mangroves show a great apparent change in the climate of this part of Florida. They were all destroyed by the great frost as far south as Cape Canaveral, and, from the size of the dead trunks that now cover the marshes, must have been growing for a century. Since the first destruction a second growth sprung up, and after attaining a height of seven or eight feet, was in its turn killed by the cold, and in 1854 a third growth was just making its appearance.

Peucæa Bachmani. This was the only sparrow I saw in the pine barrens near Enterprise, and this only occasionally. It is one of the most difficult birds to shoot without a dog, as it runs round in the grass and dwarf palmettos more like a mouse than a bird, and will not fly until almost trodden on, and then only a few feet at a time. A nest found April 20, resembled in its construction that of the Savannah sparrow; it contained five pure white eggs, nineteen millimetres in length and fifteen in breadth.

Quiscalus major. The boat-tailed Grakle was the most common bird in the neighborhood of Lake Munroe, and could be seen at all times running along the edge of the water, almost in the manner of a sandpiper. They were breeding by hundreds in the reeds near the inlet to the lake. On the 6th of April some of the birds had not yet commenced laying, though the majority had hatched, and the young of others were almost fledged.

Cyanocitta Floridana. The Florida Jay is said by Audubon to be rare on the east coast. Never having visited the west coast, I do not know how much more abundant it may be there, but in the course of a morning's ride in the vicinity of Enterprise, I have seen a dozen individuals. This is one of our most interesting birds, as regards the geographical distribution of species, that I am acquainted with; inhabiting as it does the main land, and with no apparent obstacle to its movements, it is yet confined to a small part of the peninsula of Florida. The exact limits of its distribution north and south I could not ascertain in a short visit, but do not think it can exceed three degrees of latitude, if so much. I saw none north of St. Augustine, or south of Jupiter's Inlet. I never saw an individual either in the pine barrens or in a hummock; it is confined, as far as my observation goes, entirely to the scrub, as it is called. This is a growth of scrub oaks, in many places so entangled with creeping plants that it is impossible to walk through it without cutting a path. The most favorite haunts of the Jays seemed to be where there were no creeping plants; and in these localities there are generally small spots interspersed among the oaks entirely bare of vegetation. The scrubs are generally found on elevated ridges running parallel to the sea-coast, where the soil is too poor for a growth of pine. The most extensive of these that I recollect is at a short distance from Enterprise, on the Smyrna trail; it is about three miles in width, and apparently elevated eighty feet above the lake.

In its flight and action the Florida Jay resembles the mocking-bird much more than its relative the Blue Jay. It has none of the restless, suspicious manners of the latter. I have never heard it utter but one note, much softer (as Audubon states) than the usual cry of the Blue Jay. The males were generally perched upon the highest branch in the neighborhood of their nest, uttering their rather monotonous song with apparent satisfaction, and occasionally gliding or rather dropping down either to pick up some insect or to visit their mates, or when there were two pairs in the same vicinity, to chase away the rival bird if he happened to approach too nearly their peculiar territory. They seldom fly more than a short distance at a time, and seem to trust for protection to the difficult access to their abodes. They evince a great partiality for particular localities; and on the road from Enterprise to New Smyrna I found them exactly in the same places, sometimes two or three miles apart, for three successive years. Generally only a single pair is seen at a time; but in one place in the scrub mentioned above, near a large pond with a few pines scattered about it, I found three pairs. When they live in such localities as I have found them to prefer, they cannot do much mischief by destroying the eggs or young of other birds, as you may travel for miles through the scrub without seeing any other small bird. Wherever there is a house near the scrub, the mocking-bird and cardinal bird, and probably other small birds, make their nests frequently; but the jay is not fond of civilization, and is seldom seen in such a situation.

A nest found on the 15th of April in a scrub oak about three feet from the ground, was built of small twigs, compactly and carefully lined with fibres of the dwarf palmetto, that had apparently been brought a distance of half a mile. The cavity measured 120 millimetres in breadth, by 40 in depth. It contained three eggs of a light blue, sparingly sprinkled with rufous, the spots larger and more numerous toward the larger end. Another nest, found a few days later, contained five eggs of a more neutral tint, and with the spots darker and larger and more evenly distributed.

Campephilus principalis. I found these magnificent woodpeckers quite abundant in the neighborhood of Enterprise. They are not often seen in the pine barrens, but there was scarcely a swamp or hummock without at least one pair. From the quiescent state of the genital organs of the specimens procured by me from March till May, they would seem, unless these were exceptions to the general rule, to breed either very early or very late, probably the former.

Dryotomus pileatus. The Pileated Woodpecker is still more abundant. Near Fort Capron at Indian River there was an old fence of palmetto logs, which was a favorite resort of these birds; while they were busily engaged in searching for insects on one side of this fence, I have often approached them so near as to be able to touch them with my hand, but never succeeded in frightening them so as to produce convulsions by striking the log suddenly, as described by Audubon. If I remained quiet, and the bird became aware of my presence by climbing round the log so as to get sight of me, it never flew off at once, but retreated immediately behind the log; and either remained some time in the same place before flying away, or else ran along the log to some distance, occasionally peeping over the top at me. It would seem as if the sense of hearing could not be so acute as in most birds, for when they once get sight of any one who may be attempting to approach them, it is impossible to get within gunshot of them.

Aramus scolopaceus. The everglades, and the lagoons and bayous leading out of them, are considered by Audubon as the head-quarters of this bird. That this may be true of certain parts of these singular regions I think may be correct; but in the visits which I have made at different times to that portion of the everglades situated in the neighborhood of Fort Dallas, I never met with an individual. I have never met with it either on the shallow ponds and wet savannahs, so numerous in the neighborhood of Indian River, and which may be considered as the commencement of the everglades, and are apparently most favorable to the peculiar habits of the Courlan. The part of Florida in which it has been my good fortune to meet with it has been on the St. Johns and waters connected with it, between Lake Harney on the south and Lake George on the north. Above the former lake I did not ascend the river, in consequence of the troubles with the Seminoles; and below Lake George the country is so much more thickly settled that I did not think it worth while to examine this portion, though I have no doubt that it would be met with on Dunn's lake. From the banks of the river between Lake George and Lake Harney being almost entirely uninhabited, and never disturbed by steamboats, I expected that this part of the country would afford me abundant opportunities for studying the habits of this bird. My disappointment was great at finding this to be by no means the case, principally from the river being deep and narrow, and presenting but few of those shallow enlargements which are its peculiar characteristic. I saw only a single specimen of this bird here, and heard but a few others. On descending the river, I first met with it at the Wikiva, a narrow stream running into the St. Johns about twenty-five miles from Enterprise. I shot a pair here, but could not get them, as the river was entirely covered by the water-lettuce, as it is called. From the Wikiva I found them more and more numerous as I descended the river, wherever the locality was suited to their habits, until I arrived at Spring Garden Lake, where they were much more numerous than I have ever seen them elsewhere. This lake is considered by Audubon as their most northern locality, and may in a general way be so considered, though I killed a pair near the entrance of Lake George. Lake Dexter, as it is also called, is a large sheet of water that might be taken as the model of the shallow enlargements so frequent in the upper part of the St. Johns. Its surface is covered for hundreds of acres with tangled masses of floating aquatic herbs, presenting in every direction narrow and crooked channels so intricate as to be impassable for any animal less amphibious than an alligator.

The Courlan is generally seen standing on the edge of the shore, or else on the nympheæ or other broad-leaved plants which are able to support its weight. It is very tame and unsuspicious for so large a bird, always, as far as my experience goes, allowing itself to be approached within gunshot, not hiding or running like a rail, but standing in the same place, and bobbing its head up and down like a sandpiper. On taking wing it utters a loud cluck, and if a tree is in the neighborhood generally alights on it, sometimes even fifty feet from the ground ; but if not, it generally alights in some thick part of the marsh, and is not easily started again. On the St. Johns it feeds principally on a species of Natica, which is extremely abundant, and also on the small Unios. The large green snail, so common in the everglade, is not very often met with on the St. Johns. Its manner of feeding is to hold the shell in one of its feet, and then with a few blows of its powerful bill to detach the animal, which it immediately swallows. All the specimens I killed had the stomach filled with the more or less digested remains of various mollusks—principally Unios. I have never seen any of these birds swimming, like the Gallinules, though they undoubtedly can do so. The common note of this bird is the most disagreeable of any of our native birds, and resembles more that of the peacock than that of any other bird I am acquainted with ; it is if anything more powerful, and equally harsh and disagreeable. It is very fond of uttering it. Besides this, which I presume is the call-note, it makes a number of other sounds, all of the most inharmonious description, but of which I can convey no correct idea.

Incubation commences generally in February; the few nests which I saw were made on low willows. In Spring Garden Lake I saw four, on one small island about fifty feet in diameter. The number of eggs is unusually large—fifteen having been taken from one nest by a boy I employed to collect eggs for me. The Courlan is apparently very tenacious of life; several of those I shot presented extraordinary cases of fracture—one specimen had both humeri united in such a way as to shorten them more than half an inch, at the same time forming a decided angle. The same specimen had also an old fracture of the tibia. It had probably been wounded from the steamboat, it being customary to shoot at any animal large enough to make a fair mark. The flesh is considered good eating by the inhabitants, and it is consequently shot whenever an opportunity offers. From its unsuspicious nature, and its betraying its whereabouts so conspicuously by its loud cries, I have no doubt that as soon as this part of Florida is settled, it will be exterminated.

Knowing that Audubon gives an apparently careful dissection, made by McGillivray, I did not take any note of my dissection. On referring to the book, however, I was surprised to find no allusion to the curious arrangement of the trachea in the male. In the Swan and Whooping Crane the trachea makes a single turn in the crest of the sternum, and in the Guans between the skin and the pectoral muscles, but in the Courlan it forms a sort of knot before entering the thorax, about half-way down the neck. This does not present precisely the same arrangement in every specimen, the number of turns and the extent of these varying slightly. One at present before me is about an inch in diameter, and an incision made across the centre of it would divide the trachea six times.

Grus Canadensis. In a former communication I stated that the Sand-hill Crane begins to breed about the 1st of March. I have since then ascertained that it sometimes breeds much earlier. On the 11th of March a young bird was brought to me, which already stood nearly two feet in height; it was covered with down of a ferruginous color above and cinereous below; the tarsi were of a reddish-brown color. The naked skin on the head was of the same relative extent as in the adult, the bill much shorter, and the eyes large and projecting, the whole bird looking very much like a miniature ostrich. The feathers covering the body were about an inch in length, hidden by the down; the quills were about two inches in length. The young remain with their parents until fully grown, and are fed for a long time by regurgitation. They do not fly until they are as large as their parents, but run with great speed, and hide like a young partridge. A nest found on the 11th of March contained two eggs in which incubation had just commenced; another found on the 15th contained two fresh eggs, and a third on the same date contained two eggs nearly hatched. This is another of the birds whose geographical distribution is especially interesting. It is found breeding all through the lower part of the peninsula of Florida, and again in Wisconsin and the Northwest, none being found in the intermediate region except when migrating.

Gallinago Wilsonii. In a small, dry pond near Enterprise, I saw some dozens. On the 20th of April they all seemed to be paired, and from the lateness of the season seemed as if they were going to remain in the vicinity.

Himantopus nigricollis. In a little creek about a mile from Enterprise, I found every year a number of pairs of Stilts. Its flight, which resembles generally that of the Greater Yellow Shanks, is swifter and more irregular.

Ibis alba. I saw no Scarlet or Glossy Ibises while in Florida. At Indian River the White Ibises were very numerous, flying up and down the river every day. Specimens, shot as late as the 20th of April, were in the midst of the spring moult, and had not commenced laying that year. On the St. Johns I saw one large flock in the neighborhood of Volusia, but none at Enterprise.

Tantalus loculator. I visited two breeding-places of this bird; the first was in a large cypress swamp at the head waters of the St. Sebastian, a small stream flowing into Indian River about twenty miles north of Fort Capron. The trees here were more than a hundred feet in height, and I could not by any means at my disposal get access to the nests. The Ibises here were breeding in company with the large white Egret. At the other breeding-place I was more fortunate. I was informed of this by Capt. Dummet of New Smyrna, who told me that he had visited it some five or six years before, and that he presumed no other white person had ever done so. It is in the cypress swamp forming the southern border of Lake Ashby, a small sheet of water about fourteen miles from Enterprise, near the New Smyrna road. The moment the boat which I had had hauled there was launched, the alligators assembled for the purpose of examining the new visitor; and before we had arrived at the breeding-place there were more than fifty following the boat, the nearest almost within reach of the oars. On shooting a bird, the instant it touched the water it was seized by an alligator; and I was obliged to kill half a dozen of these creatures before I could secure a specimen, and even after this I was generally obliged to fire one barrel at the bird and the other at the nearest alligator.

There were probably a thousand pairs nesting here; every available spot on the tops of the cypresses had been taken possession of by a pair of Ibises, and lower down were numerous nests of the Anhingas. No other birds were breeding here except a single pair of Fish-Hawks, whose nest was surrounded by those of the Ibis. The most favorite trees were those that were growing in the water, so as to be inaccessible from the land; these were dwarfed, and gave a capital opportunity of examining as many of the nests as was desirable. On first approaching the shore, the birds all rose and flew round in circles, and, after a few of them had been killed, flew off, but soon returned and alighted out of shot, on the trees. The nests were made of small twigs, and seemed to have been occupied for several years; the cavity was deep, and lined carefully with the long moss. The eggs were three in number, nearly white, when not soiled by the parent birds or stained by the moss. Three specimens selected from some dozen gave the following measurement: the longest, 65 millimetres in length and 39 in breadth; the broadest, 58 in length and 45 in breadth; and one that seemed to be of fair average size, 59 in length and 41 in breadth. Incubation had universally commenced by the 1st of April, and many of the young were already hatched, the largest being about the size of a pigeon, and entirely covered with white down.

Audubon, in his description of this bird, alludes to Bartram's description of it in the following language: "But the habits of this bird are entirely at variance with the above quotation to which I direct your attention not without a feeling of pain." I think if Audubon had remembered what he often states himself, that the habits of birds vary at different times and places, he would not have made these remarks. It so happens that I went over precisely the same ground on the St. Johns as Bartram, and in the same way; and that strange as it may seem, when the long period of time that has elapsed is taken into view, my journal, as far as it goes, is almost an exact repetition of his. While I was in Florida I never saw a flock of Ibises except at their breeding-places, and even there, except when they were disturbed, they flew off and returned either singly or in pairs. I did not see them feeding in more than a few instances, and then never more than a pair at a time. The stomachs of all those killed by me contained nothing but crawfish, which could not have been procured readily in the way mentioned by Audubon as their *only* method of feeding.

Platalea ajaja. The Roseate Spoonbill breeds in such numbers at Indian River that I have known one person to kill sixty in a day. The wing feathers are used for making fans, and sell at St. Augustine at from $1.00 to $1.50 for those of a single bird. They commence laying at Pelican Island by the middle of February, and the young are nearly fledged by the 1st of April. On the 10th of April I found one nest containing an egg; all the rest were either empty or the young on the point of leaving them. The egg differs from Audubon's description; it measures 65 millimetres in length, by 39 in breadth, is of an elongated oval form, the difference between the two ends strongly marked. The ground color is white, sprinkled all over with bright rufous spots of different sizes, forming a ring near the large end.

Ardea occidentalis. I found all the herons that are to be met with on the Atlantic coast, with the exception of the *A. cærulea*, breeding among the keys or along the shore of the mainland; all of them on the salt water with the exception of the great Egret, and this species I found in only two places,—on the head waters of the St. Sebastian, breeding in company with the Wood Ibis, and on a small island in Lake Jessup, without any other birds. Their attachment to their breeding-places was strikingly shown at this last-mentioned place. About a month before my visit to the island, a dense tangled growth of coarse marsh-grasses and bushes, with which it was covered, had been accidentally set fire to, and many of the birds and the majority of the nests destroyed; but at the time of my visit these had been rebuilt, and the birds were again sitting on their eggs. In the few nests which had not been destroyed, and which in most instances were blackened by the fire, the young were already hatched and nearly half grown. The Great White Heron I found breeding on many of the keys. Two nests were rarely seen near each other, and only in one instance did I find two nests within twenty feet of one another. They did not, however, seem to object to the company of other species. I found one on the same bush with a nest of the Great Blue Heron; and at Sandy Key, near Cape Sable, I found several pairs breeding on the prickly pears which were growing amidst trees covered with the nests of the beautiful Louisiana Heron. I never saw more than five or six individuals feeding near each other, and I should think it was as much more solitary in its habits than the Great Blue Heron as the latter is than the majority of other species. Audubon says that they cannot be killed with anything smaller than buckshot; I found no difficulty in killing them with small shot, and should say, that like all other herons, they are easily killed if within shot. They are by far the wildest birds of the genus that I am acquainted with. I think they must commence laying by the first of February, if not sooner, as many of the young were nearly fledged by the 20th of April, and at this time, which was the date of my arrival at the keys, none were less than half grown, and all older than the young of the Great Blue Heron. At Indian River I have seen the young of the latter several days old by the 1st of March. Though I cannot speak from personal observation, as I have never been in Florida before the spring months, I am inclined to think that, from its almost tropical climate, the period of reproduction of many birds is not so narrowly limited as in more temperate climates. I have been told by many of the inhabitants that the Cormorants and Pelicans breed all through the year. I have certainly seen on the same day nests just built and birds fully fledged. At a place called Stirrup Bight, in the keys, the young Cormorants were of all sizes and ages on the 22d of April. The Pelicans I do not think commence breeding quite as early, though I have seen young by the 1st of March; still this was an uncommon circumstance, and few of the young had made their appearance before the middle of April.

Pelecanus Americanus. On the sand bars at the mouth of the St. Johns, White Pelicans can be seen during the winter and early spring months by hundreds; they do not associate at all with the Brown Pelicans. I have never seen them north or south of the St. Johns, though I have been told that there is a certain island in the Musquito Lagoon where they could be found. Why they should be found so very abundantly in a single locality, while apparently there are many others quite as suitable to their habits, and where they would certainly be much less liable to be disturbed, is quite strange.

Pelecanus fuscus. The Brown Pelican is seen during the warm months in great numbers around every inlet and bay south of St. Augustine. When flying in long lines, as they generally do, they present a singular appearance, and seem to be playing the game called by boys "follow the leader," as they alternately sail and flap their wings, each one doing so on arriving at the exact spot where the leader commenced; they also, if the sea is at all rough, follow the undulations of the waves, rising and falling with them. One of the most singular circumstances connected with this bird is mentioned by Audubon, that of the Black-headed Gulls alighting on the heads of the Pelicans after they have made a plunge. I have seen as many as fifty pairs engaged in this singular manœuvre; the Pelicans appearing to be wholly indifferent to the attentions of their more agile companions. It would seem at first that the weight of the Gull would be rather disagreeable to the Pelican, but I presume that it is not, as the latter never attempts in any way to dislodge it. The plunge of the Pelican is quite singular in its style, and I could not for a long time divest myself of the expectation of seeing one of them break its neck. They never give any indication of being about to plunge, as all other birds do, either by hovering or sailing in circles, but when apparently flying with no other intention than that of moving from place to place, they suddenly fall as if struck with an apoplexy, striking the water with so much force, and making such a splash, that I was unable to determine whether they immersed the whole body or not. It is not uncommon to see one of these birds with a hole through the membrane forming the pouch caused by the spine of some fish, and I was at first quite puzzled by occasionally seeing one with a bright red throat, until on shooting one I found that it was caused by blood from a wound of this description. I have visited a great number of the breeding-places of this bird, from the Tortugas to New Smyrna. At the Tortugas I found only a few pairs breeding, on the bushes at East Key, the principal resort of the Noddies and Sooty Terns. I found them breeding in larger and larger numbers as I went north, until I arrived at Indian River, where I found the most extensive breeding-place that I visited; this was on a small island, called Pelican Island, about twenty miles north of Fort Capron. The nests here were placed on the tops of the mangrove-trees, which were about of the size and shape of large apple-trees. Breeding in company with the Pelican were thousands of Herons, Peale's Egret, the Rufous Egret and Little White Egret, with a few pairs of the Great Blue Heron, and Roseate Spoonbills; and immense numbers of Man-of-War Birds and White Ibises were congregated upon the island, and probably bred there at a later period than my visit. North of Cape Canaveral the mangroves being destroyed, they place their nests upon the ground as in the Gulf of Mexico. On one island that I visited, the nests were arranged either accidentally or intentionally in rows. They do not seem inclined to relinquish their habitation very readily. Opposite Dunlawton, a plantation at New Smyrna, is an island where they must have been disturbed for many years, but at the period of my visit they were engaged in arranging their nests, which covered the greater part of the island. The process of laying must be attended with more difficulty in the Pelican than in other birds, if we can judge from the fact that the eggs are always more or less marked with blood. I have seen hundreds of the fresh eggs, and have never found one free from this peculiarity. Audubon, in his description, alludes to this as "a few faint streaks of a rosy tint." The eggs are as undesirable an article of food as the birds themselves. On one occasion, having been on short allowance for a day, I endeavored, in company with some of the officers then stationed at Fort Capron, to make a meal of them, but, after a few mouthfuls, we decided unanimously that it was better to go hungry a little longer. Three eggs selected from a large number gave the following measurements,— one, 72 millimetres in length, by 43 in breadth; another, 75×47, and a third, 63×45, the second being about typical as to proportions, but rather larger than the average.

Sula fusca. These birds were quite numerous at the Tortugas, but I did not find any breeding there. I was told by the keeper of the light, who had been familiar with the locality for eighteen years, that he had occasionally found an egg on Northeast Key, a mere sand-bank, which he presumed had been dropped without the bird intending to hatch it, but that he had never seen or heard of a nest on a tree. I inquired of all the fishermen and wreckers, but could find no one who had ever seen any breeding at the Tortugas. If Audubon's description were not so detailed, I should think he had seen them perched on the Pelican nests, where they seem to be quite at home, and taken them for the real owners.

Sterna Cayana. On the 8th of May I visited Northeast

Key, and found this tern breeding there in great numbers, in company with Cabot's Tern, *S. acuflavida*; the nests of both species were mere hollows in the sand, and placed as near together as the birds could sit without disturbing each other. The eggs of the Cayenne Tern were generally of nearly the same size, and did not offer much variety in the markings compared with those of most terns. Three of them measured as follows: one, 63 millimetres in length by 39 in breadth, a second, 57×42, and the third, 58×41, the last two of the more usual form. The eggs of the *S. acuflavida* varied very little in size or shape, but much more so in the marking than those of the larger species. Beside these two species, I found the Little Tern and Wilson's Tern breeding at different localities among the keys, and along the shore of the mainland. I saw no specimen of the Roseate Tern. The Noddy and Sooty Tern were breeding at the Tortugas in as great numbers as at the time of Audubon's visit.

Dr. Cabot remarked that he was glad to find his opinion confirmed that the young Red Owls are mottled, and the adults red; an opinion which he had long ago maintained, but which even now is not accepted by all ornithologists.

Dr. Brewer mentioned that he had observed differences in the eggs of Caracara Eagles from Cuba and South America; this, with the difference of the tarsal scales noticed by Dr. Bryant, seems to indicate that the two varieties may be distinct species. He also said that a specimen of Bachman's Finch had been shot last year at Berlin, Mass.

Dr. Brewer read a paper on the distribution and habits of the Summer Yellow-bird, as follows:—

This familiar warbler extends from 68° N. to the northern parts of South America, and from ocean to ocean. It arrives in New England in the first half of May; it is familiar and social, building its nest near houses, and even in crowded cities. The nest is usually made in a low bush, not more than three or four feet from the ground, and its construction displays a remarkable power of adaptation to circumstances, approaching almost to reason; it is firmly and durably built, of a great variety of soft materials; cotton, when it can be found, is a favorite substance.

The female displays wonderful sagacity in the manner in which she avoids the necessity either of abandoning her nest or of hatching the egg of the Cow Blackbird which has been dropped into it; the latter is too large to be removed by the Yellow-bird, and is accordingly covered over, at the same time with her own eggs, probably having been previously pierced; and upon the floor thus made at the bottom of her nest, she lays another set of eggs, building up the sides of the nest to the requisite height—this she has been known to do for this cause even to the third nest-making. From an observation of twenty-five years he believed that the Yellow-bird never hatches the egg of the Cow Blackbird, but always disposes of it in the above manner, sacrificing her own eggs rather than hatch out a stranger which her instinct tells her will destroy her offspring, and impose a heavy burden on herself. That such two-storied nests are not more often found may be owing to the fact that the warbler is a very close sitter, rarely leaving her nest after the deposition of the first egg, so that the blackbird does not find many opportunities of dropping an egg into the nest.

Mr. Putnam mentioned having found three of these two-storied nests in a single season, in this State.

Dr. L. M. Sargent mentioned the case of a woman under his observation, in whom there exists a small supplementary mammary gland, with the characteristic secretion.

Dr. C. T. Jackson exhibited some specimens of Tetradymite, or Telluret of Bismuth, associated with native gold, from Dahlonega, Georgia; the associated rocks were very rich in gold, four times richer than in California. He also exhibited some Itacolumite containing gold, from Hall Co., Georgia, a locality where diamonds of considerable size have been found—and beautiful crystals of Rutile, with Pyrophyllite, from Lincoln Co., Georgia, where it occurs in large masses. In the gold region there are great quantities of specular iron ore; it is proved at every eruption of Vesuvius that specular iron ore is formed from the decomposed chloride of iron; he believes that in this gold region the gold is brought up with the iron, both in the state of chloride, from which the precious metal and the specular iron are afterward separated by decomposition.

A memorial was presented by Mr. W. E. Baker, describing a plan for the accommodation of the principal associations of science and art in the city, in a large building, and asking its consideration by a committee of the Society. The plan and the subject in general were referred to a committee, consisting of the following gentlemen, viz:—Dr. S. Cabot, Jr., Prof. W. B. Rogers, and Messrs. Barnard, Bouvé, and Whittemore.

Dr. H. R. Storer, having resigned the Curatorship of Crustacea, it was voted that he be requested to serve until the Annual Meeting.

Messrs. John Cummings and C. W. Tuttle were elected Resident Members.

February 2, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Prof. Agassiz made a communication on some new Actinoid Polyps of the coast of the United States.

He remarked that Prof. J. D. Dana made the first step toward a natural classification of polyps, when he divided the order of actinoids into the sub-orders *actinaria* and *alcyonaria*, the former including those actinoids with many simple tentacles, the latter those with eight compound tentacles.

The first specimen described was a new species, with twelve thick and blunt tentacles; the number of tentacles is few compared with those of actiniæ generally; it is of a brown color, and exists as a parasite on the common large brown medusa, *Cyanea arctica;* he named it *Bicidium parasiticum.*

Another was found at low-water mark in Nantucket harbor, a foot or more deep in the sand, sometimes attached to small stones; the shape is elongated and cylindrical, never hemispherical; the tentacles are twenty in number, ending in knobs; the color milk-white, the ends of the tentacles brown; he named it *Corynactis albida*—the *Actinia clavata* of Rathke, from the coast of Norway, probably belongs to this genus. It builds a tube of sand, which is readily disintegrated.

In Charleston, S. C., in 1852, Mr. H. J. Clark obtained several specimens of a polyp, two feet long when expanded, which burrows in the mud-flats, and builds an elastic case of mud and mucosities. It has two sets of tentacles, one around the mouth and the other around the margin of the upper disk of the body; the form is elongated and tapering—in the vertical lamellæ the upper part of each has female organs, and the lower part male organs, instead of alternating on different lamellæ as is usual; it belongs to the genus *Cerianthus.* It differs from other actiniæ in the form and arrangement of the tentacles, in the shape of the body, and in having an anus at the lower extremity. Taking form as determined by internal structure as the characteristic of families, it must be considered as belonging to a distinct family; *Corynactis,* for similar reasons, belongs to a separate family.

We should have in this case three groups belonging to the Actinoids, namely, *Actinidæ, Corynactidæ,* and *Cerianthidæ,* groups higher than families and lower than orders, and accordingly properly called sub-orders.

Dr. C. T. Jackson presented specimens of the red bug (*Reduvius*), a beetle which does much injury to the sea-island cotton by causing a red stain; he had not succeeded in obtaining any coloring matter from them by chemical means.

He presented also some pyrophyllite, or radiated talc, from Lincoln Co., Georgia; this is a trisilicate of alumina, containing a little water, and exfoliates in a very remarkable manner under the action of heat. It is found associated with rutile, and here, as in Russia, in rocks bordering on the gold formation.

Mr. Sprague called the attention of the Society to a collection of 344 bird skins, snake and monkey skins, and several crania, and other specimens from Brazil.

These objects were sent to B. F. Stevens, Esq., of Boston, by Dr. John C. Reinhardt, of Sorocaba, province of San Paulo, about 300 miles west of Rio Janeiro. This gentleman was engaged as naturalist on board the U. S. frigate Constitution in 1844, and made the voyage round the world under Capt. Percival. He had previously made a trip up the Amazon with Lieut. Strain. His collections were sent to the Smithsonian Institution in 1846. He settled at Sorocaba, and Mr. Stevens, at Mr. Sprague's request, suggested to him that objects of natural history from Brazil would be valuable here. The result was the receipt of two large boxes of specimens by Mr. Stevens, who presented them to the Society in Dr. Reinhardt's name.

Though there are many duplicates, several species will be new to the Cabinet. In general terms the collection contains 70 Humming-birds (6 species), 34 Parrots (7 species), 28 Woodpeckers (7 species), 65 Shrikes and Flycatchers, more than 20 Tanagers, 13 Cuckoos (2 species), 5 Anis, 6 Hawks (4 species), 4 Owls (3 species), 5 Pigeons, 4 Goatsuckers, 6 Toucans, 2 Cassicans, 5 Trogons, 8 Finches, 15 Thrushes, 4 Blackbirds, 2 Swallows, 5 Jacanas, 6 Gallinules, 3 Ducks, a Heron, and several miscellaneous specimens. It contained also the skulls of a Jaguar, Tapir, Brocket deer, Armadillo, Paca, two Howling monkeys and a hyoid pouch, and a smaller monkey, the skins of two Anacondas, and a small monkey of the genus *Midas;* a large fish of the genus *Chalceus*, probably the species *Amazonicus*, a very valuable specimen; the pensile nest of an Oriole; and a large shell of the genus *Bulimus*.

It was voted that the thanks of the Society be presented to Dr. Reinhardt and to Mr. Stevens for this valuable donation.

The Committee appointed at the last meeting to take into consideration a plan submitted for procuring better accommodation for the Society's cabinet and library, reported to recommend the appointment of a committee to confer with such Societies, scientific, literary, and industrial, as may be deemed advisable, with power to arrange some plan for joint action for the procurement of land, funds, &c., and that said committee be urged to prompt action, with the view of petitioning the present legislature for aid.

The Report was accepted; and the same committee was reappointed, with power to fill vacancies, and to increase their number to seven.

Mr. J. M. Barnard, from the committee on the memorial to the legislature concerning the republication of Dr. Harris's work on Insects, with illustrations, reported that the memorial had been presented and strongly advocated, with a good prospect of success as far as could be ascertained. It would take two years to make the necessary collections, and the labor of making these had been freely assumed by many competent persons. The Report was accepted, and the committee discharged.

Mr. Charles Stodder exhibited 60 species of *Diatomaceæ*, of 12 genera, found in a small stream in West Roxbury by himself in July, 1858; of these, two were new species of *Stauroneis*, which he called *S. Baconiana*, and *S. pellucida*.

The list is as follows:—

Eunotia monodon, diodon, triodon, tetraodon, pentodon, diadema, hexaglyphis, octodon, eneaodon, decaodon, hendecaodon, serrulata, prionotus? quindenaria, bidens, 15.

Himantidium arcus.

Surirella biseriata, W. S. variety.

Tabellaria trinodis.

Synedra ulna.

Gomphonema geminatum, acuminatum, coronatum, turgidum, gracile, 5.

Cocconema lanceolatum.

Cocconeis placentula.

FAMILY NAVICULACEÆ.

Navicula dilatata, amphigomphus, fusidium, dicephala, legumen, biceps, platalea, 7.

Pinnularia legumen, dactylus, digitus, macilenta, decurrens, inequalis, termes, major, W. Sm., leptogongyla, viridis, 10.

Stauroneis platalea, Ehr., pteroidea? lanceolata, Kutz., gracilis, amphicephala, Baconiana, C. S., nov. spe., pellucida, C. S., nov. spe., Baileyii, phœnicenteron? anceps, isostauron, cardinalis, aspera, birostris, Ehr., 14.

Amphiprora navicularis.

And several undetermined species of Synedra, Navicula, Pinnularia, Himantidium, Cymbella, Fragillaria, Diatoma? Cocconeis, Tabellaria, Homœocladia, Melosira.

The description of the two new species is as follows:

Stauroneis Baconiana. Stauroneis medium size; side view beaked; beaks produced; apices rounded; stauros extends to the margins; very fine transverse lines radiating from centre.

Front view (of Wm. Smith, lateral of Ehrenberg) not quite so wide as side view, and the beaks have a very slight sigmoid curve.

Lon. .12 to .14 millimetre; side view lon. 6½ times the breadth; front view 6 times the breadth. Abundant.

Outline of side view resembles *S. Sieboldii*, Ehr., but is much more slender, the longitude of Sieboldii being 4 times the breadth. Front view of Sieboldii unknown.

Stauroneis pellucida. Very small. Side view: outline of sides a regular curve, apices truncated and broadly rounded, stauros broad, nearly square, and does not extend to the margins, median line and terminal apertures (so called) very distinct, no striæ detected with Ross's $\frac{1}{8}$ in. objective. Front view: form the same as side view, except the sides are nearly parallel, instead of being as much curved as in side view.

Lon. $\frac{3\frac{1}{2}}{100}$ mm. lat. $\frac{1\frac{1}{2}}{100}$ mm. Very rare.

Mr. William E. Baker, of Brookline, was chosen a Resident Member.

February 16, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Mr. T. J. Whittemore read the following description of a new species of Helix, from Maine.

HELIX MILIUM Morse.

Shell minute, transparent, shining; epidermis white, with a greenish tinge; distinctly and regularly striated above; whorls rounded, rapidly enlarging; suture very deeply impressed; spire slightly elevated; microscopic lines running parallel with the whorls, more conspicuous beneath; umbilicus quite large, deep, and showing all the volutions; outer lip sharp.

Diam. 0.05, height 0.02.

Distribution—Portland, Me.; Augusta, Me.; Bethel, Me; Saco, Me.; Westbrook, Me.

Observations. The rapidly enlarging whorls remind one at first sight of the young of *H. indentata*, Say. The under side resembles slightly the young of *H. minuscula*, Binney. It is about the size of *H. minutissima*, Lea.

The peculiarities of the shell are its diminutive size, its rapidly enlarging and well-rounded whorls, its deep and regular striations, which become obscure at apex, and the microscopic lines running parallel with the whorls.

This little shell I first found at Mt. Independence, Westbrook, Me., Aug. 16, 1857, in company with *Pupa exigua*, Say, and the smaller Helices.

Found generally on low lands, where they seemed to be surrounded by water, though it has been found on high lands where the ground was comparatively dry. Mr. Charles B. Fuller, of Portland, found them quite numerous in a grove of pines,—an unusual place for Helices to be found in.

Dr. C. T. Jackson observed that, having searched in vain for a red dye in the red-bug (*Reduvius*), he had found the whole insect rapidly soluble, with effervescence, in nitric acid, forming a dark brown solution. On dipping a piece of flannel prepared by an alum mordant into this solution, and then into an ammoniated solution, he obtained a deep rich orange and permanent dye; it does not take well on cotton fabrics. A permanent yellow dye, and one which could be used as a basis for greens and browns, would be a very desirable thing, as much of the yellow flannel is dyed with chromate of lead, as well as with the yellow berry, and might prove dangerous if worn next the skin. It does not make a good pigment, as its lake is ochreous, and not a desirable color. These insects are very abundant and destructive, and the possibility of their being made available in the arts would add another and a powerful motive for their collection and destruction.

Dr. Jackson also made some remarks on the corrosive properties of Mexican guano.

This substance in twenty-four hours will destroy the bags which contain it, in a few days will render a cask rotten, and in the course of a short voyage will so dissolve out the oakum used in caulking vessels as to render them leaky, as has been proved in several instances, to the knowledge of Mr. P. A. Stone, of Boston. This guano has been so altered by the action of rain and sea-water, that it presents an excess of phosphoric acid, in the form of soluble acid phosphate of lime. Whether the solvent action is due to free phosphoric acid, or to the presence of the animal matter with it, is not satisfactorily determined. The ammoniacal guano, such as that from the Chincha Islands, has no such effect on cloth or wood.

Prof. Parsons referred to a statement of some chemist in Cincinnati, that all our native grape juice has a relative excess of malic acid, and a great deficiency of tartaric, differing in these respects from that of European grapes.

Dr. Jackson stated that American wines contain considerable tartaric acid, and that it is abundant in our wild grapes.

Prof. Parsons thought that, at the present prices of American wines, no other so profitable use could be made of land as to plant it with vines.

Edwin Harrison, of St. Louis, was chosen a Corresponding Member, and Messrs. Benj. Perkins, Jr., of Roxbury, C. L. Amory and M. D. Ross, of Boston, Resident Members.

March 2, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Dr. C. T. Jackson gave a sketch of the theory of metamorphism in geology as now generally adopted. He also spoke in detail of the experiments of Daubrée in France, which have proved that water at moderate temperatures will transform and produce minerals, and even ores; and that glass, under the action of water at 400° C., becomes an opaque spongy mass filled with quartz crystals and Wollastonite, the water becoming a saturated solution of silicates of potash and soda. Pine wood in his tubes became anthracite so hard that steel would hardly scratch it; a result which affords a satisfactory explanation of some of the phenomena of the coal-fields which have long been subjects of dispute. Some authors maintain that bituminous coal has been formed from resinous plants only; others have said that all coal was originally bituminous, anthracite being caused by the driving off of the bitumen, and being nothing but a compressed coke—both these explanations are unsatisfactory. If we regard the anthracite coal-fields of Pennsylvania as having been acted upon by hot water under ocean pressure, the explanation seems satisfactory;

on the contrary, the Western coal-fields, highly bituminous and undisturbed, have probably been formed without such agency. From this it would appear that anthracite or bituminous coal may be formed from the same plants, according to the presence or absence of heat, water, and pressure.

Mr. Stodder observed that a similar theory had been offered, he believed, by Mr. T. S. Hunt; and also by Prof. Rogers, who ascribed the change to the presence of heated steam.

Dr. Jackson alluded to the manner in which the native copper and silver of Lake Superior are formed; in his opinion from the chlorides of these metals in contact with iron, as he had explained at a previous meeting in regard to gold. It is well known that at the junction of the trap with the metalliferous vein, the rock becomes brown from the oxidation of the iron. When once deposited, it continues to be formed by the operation of the same causes; and when the copper is deposited, pure metallic silver, formed from the chloride, is plated upon it; the two metals, chemically pure, are in contact, yet unalloyed. The old theory of the formation of these deposits from acid solutions is unsatisfactory, and unable to account for the absence of the ordinary lime salts.

The resignation of Mr. A. E. Agassiz as Curator of Entomology was announced and accepted; and Dr. Durkee and the Secretary were appointed a committee to nominate his successor.

Dr. John C. Reinhardt, of Sorocaba, Brazil, was chosen a Corresponding Member of the Society; and Messrs. William Putnam, of Boston, and Emanuel Samuels, of Mattapan, Resident Members.

March 16, 1859.

T. T. Bouvé, Esq., in the Chair.

Mr. T. J. Whittemore presented some living specimens of *Helix aspersa* from Rochelle, France, and said he hoped that some of the members would attempt to preserve them. They can be kept alive until vegetation springs up by keeping them warm and feeding them with damp bread. They are used as food by the peasantry of France.

A fine specimen of cannel coal from the Western Mining and Manufacturing Company's mines on Big Coal River, a tributary of the great Kanawha, Boone Co., Virginia, was presented by Mr. Joshua W. Richardson, of Boston.

The principal deposits are contained in two veins of an average thickness of 40 inches; they lie in the mountain 140 to 160 feet above the level of the valley, and about 20 feet apart; the inclination of the deposits being only 1 foot in 70 affords sufficient facilities for drainage. The deposit is columnar in its structure, with a horizontal lamination admitting of cleavage both ways, so that it is easily mined by means of the pick and wedge. For purity it is probably unsurpassed; it is in demand chiefly for the manufacture of coal oil, though it is excellent as fuel. The thanks of the Society were presented for the donation.

Dr. C. F. Winslow presented the animal of a gigantic clam from Puget Sound, said to be able to project its tube from eighteen to twenty-four inches. It is eaten by the Indians. He stated that he had specimens of the shells measuring about 5×4 inches. Dr. Gould thought the species was probably *Panopæa generosa*, Gd.

Dr. Kneeland exhibited specimens of copper from Lake Superior, illustrating the remarks of Dr. Jackson at the previous meeting in reference to the deposit of metallic silver and copper in contact, yet unalloyed, and to the forms impressed in the copper by crystals of other mineral substances.

Dr. Cabot remarked that Mr. Baird, in Vol. 9 of the Pacific Railroad Report, makes *Scolopax Drummondii* a synonyme of *S. Wilsonii*, though with a *quære*. Dr. Cabot had obtained specimens of the latter in Massachusetts at all seasons of the year, and he never saw one approaching the former in plumage; the proportions of the two species are also unmistakably different. In his opinion it would be hard to find two allied birds more different in almost all respects than the two considered the same species by Mr. Baird.

Mr. James Lewis, of Mohawk, N. Y., a corresponding member, writes, in a letter addressed to the Secretary:

That within a few years, the Mohawk River has afforded specimens of *Menobranchus maculatus*. The first that he had any information of was caught about five years ago in a net, by persons fishing in the Mohawk. It was then considered a very rare thing. More recently, they have been taken on hooks by anglers; and are beginning now to be of less interest as novelties. Early last spring, while the foundations of one of the old locks in the Erie Canal at this place were being taken up, to be replaced by a new structure, several specimens of this reptile were seen, one of which, about sixteen inches long, was taken alive and brought to him. In the summer following, two about a foot long were taken by a fisherman in the Mohawk. They undoubtedly have come out of the great lakes, probably through the canal from Oswego, and very likely will, ere long, be common in the canal and river, from near Oneida Lake to Albany.

Prof. Parsons alluded to the method of preserving food in air-tight vessels. According to Liebig's theory of eremacausis, if the can be not completely exhausted of air, the decay caused by the chemical action of the oxygen of a single bubble, propagates itself until the whole mass is infected.

From experiments made by Rose, some doubts have arisen as to whether the decay is produced by the chemical action of oxygen; this chemist was inclined to attribute this effect to the action of living organisms contained in the air, and he found that by passing the air through red-hot tubes, so as to destroy all organic life, no effect of decay was produced in the meat exposed to it; he ascertained that these minute organisms could be arrested, though not destroyed, by sifting the air through sponge or tubes filled with asbestos—the tubes he employed were of various substances, and about the size of a pigeon's quill. His theory is strongly in favor of the propagation of epidemic diseases by minute living organisms floating in the air. There may be a difference of opinion in the case of decayed food, whether the change-producing cause be minute organisms, or particles of matter in a state of incipient decay which readily is communicated to the whole mass.

He thought this a matter of considerable practical importance, as the lives of many, and especially of Arctic voyagers, depended in a great degree on the perfection of this preserving process. It has been forcibly suggested and maintained by the London Times, that the fate of Sir John Franklin and his party may have been decided by the imperfect preservation of such articles of food.

Mr. F. H. Storer remarked that the articles to be preserved are boiled, not only to expel air, but to coagulate the ferment in the meat; in fact, the air cannot be fully expelled. He did not think that Rose proves that the cause of decay resides in minute living organisms, rather than matters in a state of incipient decay.

Mr. F. W. Putnam said, that at a previous meeting he had stated that possibly the young specimens of Pomotis presented by Mr. Thoreau were the *P. obesus* of Girard. He had since then examined Girard's original specimens, and found them to be the same. The *P. guttatus* recently described in the Proceedings of the Academy of Natural Sciences at Philadelphia is identical with *P. obesus*. Having teeth on the palatines, and consequently belonging to the genus *Bryttus*, the proper name for the species is *B. obesus* (Putnam). He had also satisfied himself that the *Esox ornatus* of Girard is the same as the *E. fasciatus* of Dekay.

The Corresponding Secretary read the following letters, viz :—

From the Académie Royale, &c., de Belgique, June 28 and December 18, 1857 ; Royal Geographical Society, December 30, 1857 ; Naturhistorischer Verein, Bonn, January 11, 1858 ; Zoölogisch-Botanischer Verein, Wien, March 15, 1858 ; Verein für vaterländische Naturkunde in Württemberg, May 31, 1858 ; Société Royale des Sciences de Liége, June 15, 1858, in acknowledgment of the receipt of the Society's publications ; Société Imperiale d'Agriculture, d'Histoire Naturelle, &c., de Lyon, Lyon, April 2, 1858 ; Oberhessische Gesellschaft für Natur-und-Heilkunde, April 6, 1858 ; Société Royale des Sciences de Liége, June 15, 1858 ; Société Linnéene de Lyon, July 2, 1858, presenting their various publications ; H. Davis, M'Gregor, Iowa, concerning certain specimens intended for the Society ; J. L. Laporte, Bordeaux, November 14, 1858, proposing an exchange of shells ; Royal Dublin Society, September 25, 1858, presenting its Journal, and requesting an interchange of publications ; and Edward S. Morse, Taunton, January 17, acknowledging his election as Corresponding Member.

The committee appointed to nominate a candidate for the office of Curator of Entomology, rendered vacant by the resignation of Mr. A. E. Agassiz, reported the name of Mr. Samuel H. Scudder of Boston, and he was elected.

Messrs. James A. Cutting of Chelsea, Samuel H. Gookin of Boston, John C. Comstock of Cambridge, and Dennis Murray of Roxbury, were chosen Resident Members.

DONATIONS TO THE MUSEUM.

January 5, 1859. A specimen of pilot fish, *Naucrates*, from Provincetown, Mass.; a squid, differing from the common one, from Provincetown; some bivalve shells from the Gulf of St. Lawrence; a mummified fish of the eel family from the abdominal cavity of a cod; and two large hooks taken from the livers of apparently healthy cod; by Capt. N. E. Atwood, of Provincetown. A nest of *Zonotrichia pusilla*, Wils., containing three of this bird's eggs, and one of the *Molothrus pecoris*, Gmel.; and the nest of a *Vireo;* by James G. Shute.

January 19. A gopher from Illinois; by Mr. John F. Edwards, of Boston. A pipe fish, *Syngnathus Peckianus*, from Boston harbor: by Dr. S. Kneeland, Jr.

February 2. Specimens of the red bug, *Reduvius*; by Dr. C. T. Jackson. 344 bird skins, snake, and monkey skins, and several crania, from Brazil; by Dr. José C. Reinhardt, of Sorocaba, Brazil. A ring-necked snake, and an orthopterous insect (*Mantis*) from the Lake Superior copper region; by Mr. A. C. Davis, of the Norwich mine.

February 16. Fibres of the inner bark of a Californian tree, resembling Manila hemp; by T. J. Whittemore.

March 16. Living specimens of *Helix aspersa*, from Rochelle, France; by T. J. Whittemore. A piece of cannel coal, from Boone Co., Va.; by Joshua W. Richardson, of Boston. The animal of a gigantic clam, *Panopæa generosa*, Gd., from Puget Sound; by Dr. C. F. Winslow, of West Newton. Larvæ and perfect insects of a large borer from the Cape de Verd Islands; death's head moths from St. Helena; and peat marl, containing minute shells, from the neighborhood of Milwaukie; by Dr. A. A. Gould. Fragments of cedar channelled by boring larvæ; by Dennis Murray, of Roxbury.

BOOKS RECEIVED DURING THE QUARTER ENDING MARCH 31, 1859.

Synopsis of Report on Zoöphytes of the U. S. Exploring Expedition. By J. D. Dana. 8vo. New Haven. *From the Author.*

Ichnology of Massachusetts. By Ed. Hitchcock. 4to. Boston, 1858. *From the Author.*

Report of the Geological Survey of Connecticut. 8vo. Pamph. By C. U. Shepard, M. D. New Haven, 1837.

Smithsonian Contributions to Knowledge. Vol. X. 4to. Washington. *From the Smithsonian Institution.*

Prodromus descriptionis Animalium evertebratorum. Auc. W. Stimpson. Pars VII. 8vo. Pamph. *From the Author.*

History of the Fishes of Massachusetts. By Dr. D. H. Storer. 4to. No. 4. pp. 131–194. *From the Author.*

Edinburgh New Philosophical Journal. New Series. Nos. 14, 15, 16. 8vo. Edinburgh. *From Prof. Henry D. Rogers.*

Notes on American Land Shells. By W. G. Binney. No. 4. 8vo. Pamph. *From the Author.*

Fourth Report on the Geological Survey of Missouri. By G. C. Swallow. 8vo. Pamph. 1859. *From the Author.*

Catalogue of Shell-bearing species of Mollusca. By Frank Higgins. 8vo. Pamph. *From the Author.*

Explanations of a second edition of a Geological Map of Nebraska and Kanzas. By F. V. Hayden, M. D. 8vo. Pamph. Philadelphia, 1858. *From the Author.*

Field Notes of Geology. By A. Osborn. 12mo. Pamph. New York, 1858. *From the Author.*

Notices of Insects known to form the basis of Fungoid Parasites. 4to. Pamph.

Journal of Proceedings of the Massachusetts Horticultural Society. March, 1859. *From the Horticultural Society.*

Proceedings of the American Association for the Advancement of Science. Vol. XII. 8vo. Cambridge, 1859. *From the Association.*

Geology of N. America. By J. Marcou. 4to. Pamph. Zurich, 1858.

American Geology. By J. Marcou. 8vo. Pamph. Zurich, 1858. *From the Author.*

U. S. Naval Astronomical Expedition. Vol. VIII. By Lieut. J. M. Gilliss L.L.D. 4to. Washington.

Explorations and Surveys for a Railroad Route from the Mississippi River to the Pacific Ocean. Vols. VIII. and IX. 4to. Washington, 1858. *From Hon. Charles Sumner.*

Observations on the Genus Unio. By Isaac Lea. Vol. VI. Part 1. 4to. Philadelphia.

Account of the Remains of a Fossil extinct Reptile. 8vo. Pamph. Philadelphia, 1859.

Descriptions of the Embryonic Forms of thirty-eight species of Unionidæ. By Isaac Lea, L.L.D., &c. 4to. Pamph. 1858.

Conchological Pamphlet. By Isaac Lea. 12mo. Philadelphia, 1858. *From Isaac Lea.*

Proceedings of the American Philosophical Society. Vol. VI. No. 60. July–December, 1858. Philadelphia.

Genera of Recent Mollusca. By H. and A. Adams. Nos. 35, 36. 8vo. London, 1858.

Verhandlungen des Zoölogisch-botanischen Vereins. Band VII. Wien, 1857.

Personen-Orts-Und Sach-Register. 1851–5. 8vo. Pamph. Wien, 1857.

Silliman's American Journal of Science and Arts. Vol. 27. Nos. 79 and 80, for January and March, 1859.

Proceedings of the Academy of Natural Sciences at Philadelphia. January, 1859. pp. 45–84.

Canadian Naturalist and Geologist for December, 1858. Vol. III. No. 6. Vol. IV. No. 1. February, 1859. Montreal.

New York Journal of Medicine. Vol. V. No. 1. January, 1859.

Canadian Journal of Industry, Sciences, &c. No. 19, for January, 1859. Toronto.

Archiv für Naturgeschichte. Nos. 5, 6. 1857. No. 1. 1858.

Journal of the Academy of Natural Sciences of Philadelphia. New Series. Vol. IV. Part 1. 4to. 1858.

Annals of the Lyceum of Natural History of New York. Vol. VI. Nos. 1, 8–13. 8vo. New York.

New York Journal of Medicine. Vol. VI. No. 2. For March, 1859.

Malakozoölogische Blätter. Band V. Bog. 3–10. 8vo. Pamph. *Received in Exchange.*

Annals and Magazine of Natural History. Nos. 13 and 14. Vol. 3. 1859.

Quarterly Journal of the Geological Society. Vol. XV. No. 57, for February, 1859. 8vo. London.

Todd's Cyclopædia of Anatomy and Physiology. Parts 51 and 52. *From the Courtis Fund.*

Life of James Sullivan. By T. C. Amory. 2 vols. 8vo. Boston, 1859.

Biography of Dr. E. K. Kane. By William Elder. 8vo. Philadelphia, 1859.

History of New England. By J. G. Palfrey. Vol. 1. 8vo. Boston, 1858.

Modern English Essayists, Carlyle, Talfourd, Stephens, Alison, Wilson, Jeffrey, Macaulay, Mackintosh, Smith. 8 vols. 8vo. Boston, 1858.

Life and Times of Hugh Miller. By T. N. Brown. 12mo. New York, 1858.

History of the Anglo-Saxons. By T. Miller. 12mo. London, 1852.

History of the Reign of Philip II., King of Spain. Vol. 3. 8vo. Boston, 1859.

Jewish Wars of Flavius Josephus. Translated by Rev. R. Trail. 8vo. Boston, 1858.

Memoirs of the Court of England under the Stuarts. 3 vols. 12mo. (Bohn's.) 1857. *Deposited by the Republican Institution.*

April 6, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Dr. C. F. Winslow read a communication from Mr. Henry M. Lyman, on the recent eruption of the volcano of Mauna Loa, in the Sandwich Islands.

The eruption occurred on the 23d of January, 1859. On the evening of Saturday, Jan. 22, the snow on the mountain was seen white and unobscured by clouds or vapors; there were no signs of smoke, and none of eruption. On Sunday, thick clouds of smoke were seen gathering about the mountain, and at evening the whole sky was lighted with a terrific glare, and the lava could be seen spouting from a crater near the summit of Mauna Loa. As in all the other eruptions from that mountain, the lava was thrown up in a jet, apparently nearly one thousand feet high; it flowed down the northern slope of the mountain, and in one or two days "formed for itself a covered channel from the summit crater to the plain between the mountains." So rapidly was it poured out, that before the morning of the 24th the lava appeared to have spread across the plain to the base of Mauna Kea. As seen from Hilo, the original source seemed to be very near the crater from which issued the flow of 1855–56; but so dense was the smoke, that on the 25th (the latest date from Hilo) nothing was known about the eruption except that it was the most brilliant and extensive on record.

A letter from Waimea of Feb. 3, states that on Monday, Jan. 24, two fiery sources were visible,—one appeared to be very near the top of the mountain, but its stream and smoke soon after disappeared; this was undoubtedly the eruption visible at Hilo on Sunday evening—the other was on the north side, further from the top, and sent out its fires in a northwesterly direction; after the third night the smoke cleared away, and showed the burning crater constantly enlarging and throwing up its volumes of liquid fire. The lava poured on in a torrent between Mauna Kea and Mauna Hualalai, until it reached the sea at a little village named Wainanalii, near the boundary between Kohala and Kona, about thirteen miles south of Kawaihae. It reached the sea during the night of January 31, and was still flowing when last heard from, about Feb. 10. The width of the stream was said to be about a mile, and the distance passed over nearly forty miles.

This is acknowledged to be the greatest eruption within the memory of any one now living at the Islands; even as far distant as Oahu the sky was obscured by the dense smoke, and at Lahaina the "reflection on the water was at times like that of the full moon."

It is said that ships sailing along the windward shores of Hawaii, Maui, and Molokai, during the week in which the eruption commenced, and before the lava reached the ocean, encountered immense shoals of dead fish; leading to the supposition that there might have been a suboceanic eruption before the outpouring from the mountain, and that possibly the whole island might have been overwhelmed, had not this side passage given issue to a portion of the lava.

Dr. C. T. Jackson remarked that instances of fish being killed by volcanic eruptions were not uncommon, and he attributed this fact not to the heat communicated to the water, but to the action of gases, especially the sulphurous, sulphuretted hydrogen, and chlorohydric acid.

Dr. Winslow was of opinion that the lava accumulates in large cavities before it is cast up, and is thrown up by a geyser process.

Dr. A. A. Gould read the following descriptions of new species of shells :—

SUCCINEA LYRATA. T. ovata, solidula, luteo-virens, undatellis flexuosis lyrata ; anfr. tribus ventricosis, apice obtuso. Apertura ovata, columellâ vix flexuosâ callo perexiguo indutâ. Axis $\frac{1}{3}$; diam. $\frac{1}{4}$ poll.

Near the sea-shore, Loo Choo. W. S.

A small ovate species, quite remarkable for its lyrate surface.

AURICULA (Leuconia, Gray) OPPORTUNA. T. parva, ellipsoidea, solida, livido-albida, lævis ; anfr. 6 ad suturam imbricato-appressis. Apertura falcata, posticè acutissima, anticè rotundata ; labio lamellâ compressâ elevatâ medianâ et lamellâ duplici anticali obliquâ instructo ; labro simplici. Long. 8 millim. ; diam. 4 millim.

Inhabits Loo Choo Is. W. S.

OMPHALOTROPIS STRICTUS. T. elongata, ovato-conica, solidula, lævis, arctè umbilicata ; anfr. 6 rotundatis ad suturam tabulatis. Apertura ovata, peritremate simplici continuo, sed posticè ad ventrem retracto ; umbilico carinâ inconspicuâ approximatâ cincto. Axis $\frac{1}{5}$; diam. $\frac{1}{8}$ poll.

On old stone walls, Loo Choo. W. S.

One of the smallest species yet described, with a very small perforation, and a faint keel around it at a very short distance.

LIMNÆA OLLULA. T. parva, tenuis, ovata, viridi-cornea, impolita ; anfr. 4+, ultimo ventricoso. Apertura rotundato-ovata columellâ simplici, posticè callo lato indutâ. Axis $\frac{1}{4}$; diam. $\frac{1}{5}$ poll.

Streams and marshes on Hong Kong Island. (Wright.)

Very much like a small *L. modicella.*

ANCYLUS GAULUS. T. obliquè pyramidata, apice ad quadrantem posteriorem longitudinis, dextrorsum inclinato, obtuso ; epidermide luteo-corneâ, supernè fuscâ. Apertura rotundato-ovata, intus plumbea. Long. $\frac{1}{5}$; lat. $\frac{1}{8}$; alt. $\frac{1}{10}$ poll.

Inhabits Cape of Good Hope. W. S.

A solid, well rounded species, without any salient characters.

PLANORBIS SPIRILLUS. T. parva, discoidea, utrinque concava, tenuis viridi-cornea, plerumque liris ad quatuor propè aperturam instructa; anfr. 3+ utrinque apparentibus, suturâ impressâ. Apertura ampla, peroblíqua, lata, lunata. Diam. $\frac{1}{8}$; alt. $\frac{1}{20}$ poll.

Inhabits Ousima. W. S.

Very like to *P. albus* and *deflectus;* perhaps the same that Middendorff refers to under the former name, as from Kamtschatka.

Segmentina lucida. T. parva, tenuis, orbicularis, dilutè cornea, radiatim viridi-lineata, supra fornicata, infra poculiformis, vix perforata; anfr. 4, ultimo lato, declivi; suturâ impressâ. Apertura ampla, posticè acuta, anticè rotundata; fauce denticulis armatâ. Alt. $\frac{1}{10}$; lat. $\frac{1}{4}$ poll.

Inhabits Loo Choo. W. S.

Smaller and more elevated than the following, with quite a different surface and color.

Segmentina usta. T. depressa, orbicularis, concavo-convexa, nitida, umbrina, latè umbilicata; anfr. 6, apicalibus arctissimis, excavatis, ultimo amplo, declivi; suturâ canaliculatâ. Apertura peroblíqua, angustè lunata; fauce in fundo quadridentatâ. Alt. $\frac{1}{10}$; diam. $\frac{6}{20}$ poll.

Inhabits Loo Choo Islands. W. S.

Resembles in color *S. Largillierti*, which is larger, less polished, more largely umbilicated.

Paludina histrica. T. ovato-conica, variabilis, tenuis, striatula, rufo-cornea; anfr. 6 ventricosis, posticè tabulatis, ultimo ad peripheriam subangulato, albido; suturâ profundâ. Apertura rotundato-ovata, subeffusa; peristomate simplici, nigrescente, umbilicum parvum subtegente. Dimens. $1 \times \frac{3}{4}$ poll.; $1\frac{1}{4} \times \frac{7}{10}$ poll. etc.

Ditches in paddy-fields, Ousima and Loo Choo. W. S.

Bithynia divalis. T. minuta, imperforata, ovato-conica, solidula, lævis, olivacea; anfr. 3+ ventricosis, ultimo permagno. Apertura parva, ovata, verticalis; peritremate continuo ad columellam flexuoso. Axis $\frac{2}{10}$; diam. $\frac{3}{20}$ poll.

Inhabits China, vicinity of Canton. Mr. Bowring.

The genus is somewhat equivocal. It has an operculum more like that of a true Paludina than of any other genus.

Assiminea debilis. T. globoso-conica, solidula, luteo-cornea, arctè umbilicata; anfr. 5 tabulatis, ultimo ad peripheriam subangulato. Apertura rotundato-ovata, peritremate continuo, vix incrassato. Alt. $\frac{7}{40}$; diam. $\frac{5}{40}$ poll.

Loo Choo Is. W. S.

Paler and less solid than any other described species; more elongated than the following, and differing in color.

Assiminea rubida. T. ovato-conica, solida, impolita, straminea aurantiaco tincta, perforata; anfr. 6 rotundatis, suturâ profundâ. Apertura parvula, pyriformis, peritremate continuo. Alt. $\frac{7}{40}$; diam. $\frac{3}{20}$ poll.

Inhabits Loo Choo, on beaches. W. S.

Rather smaller than the preceding, and distinguished by its color and solidity.

Melania libertina. T. elongata, turrita, truncata, luteo-cornea, hic illic fuscata, lineis volventibus anticè insculpta; anfr. 5+ convexiusculis. Apertura elongata tortuosa, labro albo posticè sinuato, anticè in canalem obtusam producto; fauce lividâ. Long. $1\frac{1}{4}$; lat. $\frac{1}{2}$ poll.

Simoda and Ousima, in sluggish streams and ditches. W. S.

Generally resembles *M. Virginica* and *indefinita*, Lea, which has a more lax and elongated spire. The grooving varies, and in some specimens is nearly wanting.

Melania gracilina. T. subulata, truncata, imperforata, tenuis, lævis, olivacea, sulcis acutis remotis cincta; anfr. 7+ convexiusculis, posticis attenuatis, ad suturam maculis fuscis sæpè ornàtis. Apertura angustè ovalis, vix effusa; fauce lividâ. Long. 1; lat. $\frac{1}{3}$ poll.

Inhabits Taheiti, common in streams.

Belongs to the peculiar subulate group of Polynesia; peculiar by its grooves and the dots near the suture.

Melania dolorosa. T. elongata, solida, lævis vel striis raris cincta, picea; anfr. 6+ rotundatis, ultimo bulboso. Apertura ovato-rotundata, vix producta; columella arcuata, lactea; fauce cæruleâ. Long. $\frac{3}{4}$; lat. $\frac{1}{4}$ poll.

In streams near Hakodadi. (Wright.)

Principally noticeable for its sombre appearance, usually incrusted by a rusty, felt-like coating, so as to obscure its true surface.

Neritella puella. T. parva, obliquè ovata ad ventrem planulata, lævis, viridescens, lineis angulatis fuscis et interdum fasciis articulatis ornata; anfr. 3, ultimo amplo. Apertura parva, labro producto, columellâ callo copioso indutâ, minutissimè denticulatâ. Lat. max. 7, min. 5 millim.

Inhabits Loo Choo. W. S.

Nearly of the shape and size of *N. viridis*, the spire being less prominent, and the aperture smaller.

Neritella (Clithon) penicillata. T. ovato-globosa, obliqua, lævis, viridis lineolis luteis undulatis obliquis ubique ornata; anfr. 3+ ad trientem posteriorem angulo instructis spinas tenues tubulosas ad sex armato. Apertura ampla, labro producto acuto, labio simplici, lutescente; fauce cœrulescente. Axis $\frac{6}{10}$; diam. $\frac{1}{2}$ poll.

Inhabits New Ireland. Lieut. Van Wycke.

Distinguished from most spinous species by its smooth surface, and from all by its delicate lineations.

Nerita pica. T. parva, tenuis, obliquè ovato-globosa, rudis anthracina maculis parvis multiformibus albis ornata. Spira haud elevata. Apertura semicircularis, labro simplici nigro marginata; columellâ excavatâ, nitidâ, flavescente, edentatâ. Operculum virescens, granulatum. Axis $\frac{4}{10}$; diam. $\frac{1}{2}$ poll.

Inhabits Simoda, very common on rocks.

A small, prettily marked species, remarkable for its destitution of grooves, granules, folds, and denticles.

Natica severa. T. ovato-globosa, solida, impolita, rufocinerea; anfr. 4 ventricosis posticè quadratis, apice fusco. Apertura ovata, labro posticè tenui, anticè sensim incrassato, ad columellam rotundato; umbilico magno, clavo ferè impleto. Axis $1\frac{6}{10}$; diam $1\frac{3}{10}$ poll.

Inhabits Hakodadi Bay. W. S.

From its form and exterior it might be taken for *N. heros*, but it has a very different umbilicus, resembling *N. unifasciata*.

Natica russa. T. imperforata, ovato-globosa, tenuis, lævis, epidermide tenui cerinâ induta; anfr. 4 ventricosis posticè quadratis. Apertura ovata, subeffusa, labro tenui, umbilico callo compresso albo obstructo. Operculum osseum. Axis 18 millim.; diam. 16 millim.

Arctic Ocean. W. S.

Like *N. clausa*, but larger, the whorls more broadly shouldered, the umbilical region more concave and more perfectly closed by callus than in any shell of that species I have seen.

Natica puerilis. T. parva, ovata, solida, polita, epidermide tenuissima straminea induta; anfr. 4 tribus apicalibus parvis eburnatis; suturâ obscurâ; facie ventrali planulatâ umbilico semicirculari perforatâ plerumque callo impleto. Apertura semiovalis, posticè rotundata; labro acuto. Operculum corneum rubidum. Axis $\frac{1}{2}$; diam. $\frac{3}{8}$ poll.

Inhabits Porto Praya. W. S.

Resembles *N. glabella* and *N. nitida*. It is, however, more elongated, and less flattened on the face.

Gena dilecta. T. parva, tenuis, elongato-ovalis, nitida, luteo-virens maculis albis trigonis nigro apicatis interdum serialibus ornata, striis incrementi et striis spiralibus profundioribus decussata; anfr. 3, apice ferè terminali. Apertura angusta, ovalis faciem ventralem ferè adequans; intus nitidè virescens. Long. 8 millim.; lat. ·4 millim.

Inhabits Hakodadi Bay, on shells, &c. W. S.

Very delicate and slender, allied to *G. planulata*, a much larger species, and *G. strigosa*, of which it may possibly be the young.

Vanicoro scalarina. T. ovato-globosa, tenuis, alba, costis remotis elevatis imbricantibus lyrata et filis volventibus decussata; anfr. 4 ventricosis benè discretis. Apertura ampla rotundato-ovata anfractum penultimum vix attigens, labro effuso, labio recto retracto; umbilico amplo infundibuliformi costâ marginato. Long. 10 millim.; lat. 8 millim.

Found at Loo Choo. W. S.

Like *V. Gueriniana*, but differs in its sharper compressed ribs, which stop short at the umbilical ridge.

Fossar tornatilis. T. solida, ovato-globosa, cinerea; anfr. 3, ultimo magno ventricoso costis elevatis recumbentibus alternatim sæpè minoribus ad 12 cincto (alteris tricinctis) et lineis conspicuis incrementi clathrato; suturâ canaliculatâ. Apertura semicircularis ferè sejuncta; umbilico elongato, plicato. Axis 5 millim.; diam. 4 millim.

Hong Kong Harbor, 10 faths. W. S.

Much like *F. costatus.* Without the animal or operculum it is impossible to say that this shell does not belong to the genus Vanicoro.

Dr. Gould read a letter from the President, dated at sea, 34° S., Jan. 9, 1859, in which the principal incidents of his voyage were alluded to. He was surprised at finding large numbers of *hydrometridæ* in mid ocean, where they sport on the surface as the so-called water-spiders do on fresh water. The phosphorescence of the sea was remarkable, the bodies of porpoises and fish passing through it seeming to be covered with a sheet of flame. He thought the phosphorescence due both to the presence of living organisms in the water, and to that of diffused particles of matter. Dr. Gould referred to its being seen wherever there is agitation of the water, serving as natural light-houses to warn the mariner of rocks and shallows. In a postscript dated Jan. 13, his vessel had come to anchor off Monte Video.

Dr. C. T. Jackson spoke of the peculiarities of thermal springs, and remarked that they are generally found along the line of disruption of strata of rocks, and near the junction of eruptive rocks with those of aqueous deposition. In the Vosges it is at the line of contact of granite and the new red sandstone that the hot springs of Plombières are found. The waters of these springs have a temperature of 73° Cent., or 163° Fahrenheit.

These waters contain 0.03 grammes of silicate of potash per litre. Ancient Roman baths were found at these springs, and the river had been turned out of its natural channel into an artificial one, in order to accommodate the construction of the baths. In these ancient works were found bronze stopcocks, in which the bronze was changed into gray sulphuret of copper. In the bricks of the Roman works, numerous crystals of zeolite minerals were found, which had been formed in the cavities by the action of the mineral waters; also small crystals of fluor spar. Among the minerals thus formed are Apophyllite, Chabasie, Gismondine, Scolecite, Harmotome, Chalcedony, Malachite, Hæmatite, Okenite, Opal, Hyalite, Arragonite, Calcareous Spar, and a variety of Stilbite. The alkaline mineral waters acting on the components of the bricks and cement formed double silicates most readily. The Apophyllite was found in the cement and not in the bricks, while Chabasie was found in the bricks.

The conditions required for the formation of zeolite minerals are fulfilled most perfectly, when trap rocks are thrown in a molten state into beds of new red sandstone strata. The humid sandstones and slates of that series are in the very condition required for the chemical combinations to take place, under the heat of the trap rocks, and the influence of heated saline waters.

Trap breccia is a mixture of scoriaceous trap rock and sandstone. Amygdaloid is the scoria produced by the interfusion of trap rocks and sandstone. Now in Nova Scotia, all along the shores of the Bay of Fundy, we find in the utmost profusion the Zeolites, Quartz and Amethyst geodes, Apophyllite, Stilbite, Mesotype, Analcime, Agates, &c., in the Amygdaloid, but not in the compact trap rocks.

So on the south shore of Lake Superior, where the trap rocks have been erupted through and between the strata of new red sandstone, we find the Amygdaloid at the point of contact of the trap and the sandstone, and the Amygdaloid is filled with an abundance of Zeolite minerals, Agates, Chalcedony, &c., while the compact trap rocks are not charged with these minerals. Dr. J. therefore inferred that these minerals were produced in the Amygdaloid by agencies such as are cited by M. Daubrée.

Sea-water undoubtedly played a conspicuous part in effecting changes in the composition of rocks, and in the formation of minerals contained in the metamorphosed rocks ; and it is probable, in accordance with the views of Forchammer, Mitscherlich, Marignac, Sénarmont, Favre, and Hunt, that the magnesia of the Dolomites came from the decomposition of the chloride of magnesium of sea-water, and that gypsum was also produced by the reaction of the sulphate of soda on carbonate of lime.

Forchammer found that when sea-water was heated with bicarbonate of lime, that magnesia was precipitated, and the proportion augments at higher temperatures under pressure. He found also that gypsum was decomposed in fourteen days when in contact with carbonate of magnesia, and sulphate of magnesia and carbonate of lime resulted.

Marignac found at 200° Cent., that chloride of magnesium and carbonate of lime reacted on each other, and that double carbonate of magnesia and lime resulted. Sénarmont made a similar experiment. Favre estimates that an ocean pressure of from 500 to 600 feet is adequate to effect these changes when the water is heated.

Referring to the increase of temperature at great depths as a means of determining the thickness of the solid crust or shell of the globe, Prof. W. B. Rogers remarked, that much uncertainty must attend such calculations until all the necessary data have been ascertained. It is not merely requisite to know the law according to which the temperature augments as we descend, and the *ordinary* melting point of the different rocky materials forming the crust, but we must ascertain how and in what degree the melting point in each case is influenced by the pressure to which the heated mass is subjected.

According to the experiments of Bunsen, Hopkins, and others, spermaceti, wax, and paraffine, when heated under powerful pressure, require a higher temperature for their liquefaction than is sufficient to melt them under ordinary circumstances, where the pressing force is only that of a single atmosphere. If, with Hopkins, we assume that the melting point of rocks is in like manner raised by the pressure under which they are placed beneath the surface, we must agree with him in the conclusion that the materials of the earth's crust may retain their solid condition to a much greater depth than has been usually supposed.

We have, however, no warrant for assuming that all, or even the great mass of rocky materials, obey the same law in regard to their liquefaction as wax and the other similar substances above named. It should be remembered that these latter belong to the class of substances which contract as they pass from the liquid to the solid form, while there is another class typified by ice, in which the act of congelation is accompanied by more or less expansion. Now it has been proved experimentally by Thompson, that pressure, instead of raising, actually lowers the melting point of ice; and there is reason for regarding it as a general law, that all those bodies which expand in becoming solid are similarly affected by pressure, while the other bodies which like wax contract in congealing, have their melting point raised under the same circumstances.

As yet we are too little acquainted with the habitudes of the various rocks in these respects, to decide as to the extent to which the one or other of these opposite agencies of pressure upon the melting point may operate in the interior of the globe, or to form any valid conclusion as to their aggregate effect upon the computed thickness of the crust.

Dr. C. T. Jackson presented a box of the silky growth from the base of the fronds of tree-ferns growing at the Sandwich Islands; this substance is used by the natives for stuffing beds. Something of the kind is found in our own ferns.

Dr. Jackson also presented, in the name of Mr. C. K. Landis of Philadelphia, a specimen of a fungous growth called "Indian Bread," or "Tuckahoe," in the Southern States. He found it to contain no starch, but cellulose and considerable mucilage. It is sometimes eaten.

Mr. Sprague said that it was an underground growth, being a fungus called *Pachyma cocos*. It is supposed to be an arrested stage of some unknown plant, producing only a large sclerotioid mass, and never reaching a perfect state. Such is frequently the case among fungi, the whole genus *Sclerotium* being a heterogenous assemblage of inform growths, which are the non-developed stages of dissimilar plants.

Mr. J. M. Barnard announced that the desired appropriation for a new and illustrated edition of Dr. Harris's work on insects injurious to vegetation, had been made by the legislature.

Messrs. C. Allen Browne, and George H. Hepworth, of Boston, and Mr. Charles H. Morse, of Cambridge, were elected Resident Members.

April 20, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Mr. T. T. Bouvé read a communication as follows:

By the kindness of a friend, the valuable work on the Fossil Footmarks of the Connecticut Valley—The Ichnology of Massachusetts, by President Hitchcock,—has been loaned me for perusal. A few days since my surprise was great upon opening the volume to find a number of pages devoted to the question of who first scientifically described the Footmarks, introduced by the following remarks:—

"Some readers of this Report may be aware that about fourteen years ago a discussion took place between me and Dr. James Deane, of Greenfield, in the American Journal of Science, respecting the first discovery of the fossil footmarks. Having each of us had the opportunity to say what we pleased, it has ever since been my determination to trouble the public no more on the subject. But since the death of Dr. Deane, which occurred during the printing of this Report, some of his friends have thought it proper to revive this discussion, and, if correctly reported in the newspapers, to take such ground as does me great injustice, and casts such imputations upon my character, that I cannot suffer this last opportunity to pass, without a brief attempt to vindicate myself to the citizens of Massachusetts, and especially to its legislators, who have so liberally published this Report. I refer particularly to the Eulogy upon Dr. Deane by Dr. H. I. Bowditch, and to the statements of T. T. Bouvé, Esq. before the Boston Society of Natural History. Were it not for the high respectability of these gentlemen, I should not feel called on to enter upon this defence."

Before proceeding further, I wish to say a word upon the remark, that "since the death of Dr. Deane some of his friends have thought it proper to revive this discussion," inasmuch as in citing the instances, he refers particularly to statements made by me before this Society. I wish to deny for myself, as distinctly as it is possible for me to do it, not only having had any thought of reviving a discussion, but even having had, at the time my statements so called were made, any clear thought in relation to the discussion referred to. Indeed, so uncomfortable to me are questions generally upon priority of claims in discovery, that my mind naturally is repulsed from their consideration. I am very doubtful whether I ever read until the present occasion moved me to it, the discussion which it is now implied I have a wish to revive. Certainly I had but a vague recollection of it. But I pass to a consideration of the statements themselves. What were they that such notice should have been taken of them? In the remarks made by me upon the death of Dr. Deane, and preparatory to the introduction of resolutions expressive of the loss which the Society had sustained, I used the following language:—

"But it is in his character as a Naturalist, that we, members of the Society, feel the most interest. None of us I am sure can be unmindful of his labors in working out and faithfully portraying the remarkable impressions of the rocks of the Connecticut Valley, or of his yet more valuable and instructive observations upon these interesting mementos of past life. Whatever may be said of others who have honorably worked in the same field, this I think may be truly stated of Dr. Deane, that the first scientific observations upon the footprints were made by him. Years have since passed,—yes, nearly a quarter of a century has gone by since he first called attention to these impressions; but yet though absorbed much in the duties of his profession, he never lost his interest in them. To his mind, nurtured as it had become by their study, questions of important moment depended upon their full elucidation, and certainly he exhibited an untiring devotion in his labors towards the accomplishment of this end."

Now I will take it for granted, that the only passage in this extract to which exception could possibly be made is this,—"Whatever may be said of others, who have honorably worked in the same field, this I think may be truly stated of Dr. Deane, that the first scientific observations upon the footprints were made by him."

Now I wish to state that here, as well as elsewhere, I recognize that there may be scientific observations upon Geological phenomena of most important character made by such as have no knowledge of the science of Geology itself. If a comparative anatomist, having no knowledge whatever of Geology, should be present at the exhumation of some bones that appeared to be human from some ancient deposit, might not his observations upon them be scientific even though he failed entirely to recognize the bearing that the discovery of such relics would have upon the theories of Geologists? And so of Dr. Deane. If he, a physician acquainted with anatomy, having a recognized scientific taste, after subjecting the so-called tracks of birds to careful attention, comparing them with such as are made by living birds, taking casts that comparisons might be the better made, finally decides that the markings are those of birds, should not his observations be designated as of a scientific character? It was my impression that thus much at least would be admitted of Dr. Deane and his labors, and I therefore used the language I did, not judging that any party would object to it. If, however, it conveys the idea of more than this, if it expresses to any mind aught that would have the effect to detract from the well merited fame of one I have been happy to think of as a distinguished personal friend, I am indeed sorry I did not express my thoughts more clearly. Fortunately for my present object, which is to show that in desiring to honor the dead I intended no injustice to the living, there is a record of my views upon the discovery and investigation of the footprints which was read by me before a full meeting of the Society when giving some account of the specimens in our collection, and which I now regret was not published in our Proceedings. I will read, with your permission, so much of it as relates to both the labors of President Hitchcock and Dr. Deane, that all may see that it has been anything but my wish to deprive the former, in the estimation of a single soul, of the credit of the original scientific investigations made by him with so much advantage to science. I quote from this record.

"In the early part of the year 1835, Mr. Dexter Marsh, of Greenfield, discovered among some flagging stones, with which he was laying the walk in front of his house, a slab having upon it some impressions, which excited strongly his interest and to which he called the attention of Dr. James Deane. * * * *

"As soon as Dr. Deane's attention had been called to the subject, by seeing the slab that Mr. Marsh had discovered, and which was the first slab brought into public notice, he expressed the opinion that the impressions were those of birds, and he wrote to Prof. Hitchcock communicating to him the discovery and his own convictions. The latter, aware how unexampled was the occurrence of anything denoting the existence of birds at such an early period as their tracks on the Red Sandstone would indicate, of course could not but hesitate in admitting the force of Dr. Deane's views, until he himself saw the specimens; but observation of these dispelled all doubt. He immediately set himself about investigating the subject, bringing to this work a mind largely stored with geological knowledge, and fully appreciating the bearing that his results would have upon the preconceived opinions of scientific men, if he should be able to substantiate to them the truth of his own opinions. Aware of the incredulity with which the announcement of the discovery would be received, especially abroad, he labored hard in collecting specimens and studying them, that he might not fail to carry conviction—then boldly expressed his conclusions to the world. His first article was published in 1836. He has since given many years of his life to the elucidation of the subject, and this he has done so effectively that all doubt has been long removed as to the *animal* origin of these impressions, and almost all as to their having been made by birds.

"To Dr. Deane also the scientific world is indebted largely for information on the subject of the footprints, given by him in various publications, often accompanied by drawings and engravings by himself of the tracks so accurate as to carry conviction even if the text should fail to do so."

Now this was all that was said by me when giving a full account of the discovery of either party; and does this seem like any desire on my part to do less than full justice to President Hitchcock? The remarks in the two papers should be considered together, for I made those at the time of Dr. Deane's death, in full view of all I had before said to the same body. If a scientific character is ascribed to the early observations of Dr. Deane upon the footmarks, is it not also clearly seen that there is no intention of detracting an iota from the merit of Dr. Hitchcock as the one to whom more than to anybody else, the world is indebted for a full investigation of the whole subject?

Before concluding I will add, that of all persons I should probably be one of the last to do, intentionally, less than full justice to the claims of President Hitchcock, for no one can be found perhaps who feels more indebted to him for scientific information through his publications than myself. No one probably out of the sphere of his personal influence has given more attention to what has come from his pen. Moreover, I have sat at his table, have been the recipient of personal attention and otherwise experienced his kindness.

All this I say to show how far from me is the wish to dim the lustre of his great achievements. Far more pleasure would it give me to labor in defence of his well-earned reputation, if there were need of this. But there never will be, for it rests on too enduring a basis.

Prof. Rogers observed, that the conflicting claims of Dr. Deane and Pres. Hitchcock were those which we find accompanying all great discoveries at the present day; one man makes an original suggestion, and points out the line of investigation, which another follows to some grand and unexpected result. In the present instance, the ornithic character of these tracks had been alluded to by several, even before Dr. Deane; but he appears to have been the first who convinced himself from comparisons and examinations that these tracks were really made by birds. He thought that while to Dr. Deane is due the credit of having made the first scientific examination of these footprints, to Prof. Hitchcock we owe the thorough and comprehensive investigation of all these remains in the light of ample zoölogical and geological comparisons, and the creation from these materials of a new and important branch of American Paleontology.

Dr. J. M. Warren exhibited a series of skulls and stuffed skins of the anthropoid apes, consisting of skulls and casts of the Gorilla, Chimpanzee, and Orang, of both sexes and of different ages, and two skins of the Chimpanzee. He pointed out the principal characteristics of the three genera, and exhibited several plates from St. Hilaire of the Gorilla. He also exhibited the external and internal genital organs of the large female Chimpanzee belonging to him.

Dr. Kneeland expressed the opinion, from the examination of the Chimpanzee skulls, in which the size and proportions of the head and face, and the characters of the teeth were very different, that Chimpanzee, like Orang, is a generic term, and includes several species. It does not seem possible to refer all these to a single species of Chimpanzee, and that one the *Troglodytes niger*.

Dr. Warren alluded to the fact, which at the present time is worthy of mention, that the Gorilla was first introduced to the scientific world by Drs. Savage and Wyman, in the pages of the Journal of the Boston Society of Natural History; and that even the specimen in the Jardin des Plantes of Paris was obtained by the instrumentality of those who were making collections for this Society.

Dr. C. T. Jackson exhibited a trilobite from the calcareous slate at St. Mary's Bay, the Southern extremity of Newfoundland; it seemed identical with the *Paradoxides Harlani*, from Braintree, Mass. He said that this formation could be followed, though in an interrupted line, from Braintree to Newfoundland. As the people of Newfoundland are now directing their attention to mining, it is probable that the consequent exploration of the country will throw more light upon this interesting question.

He gave an account of the original specimen of *P. Harlani*, which was said to have been stolen from Cambridge, sold to the old Columbian Museum in Boston, and thence purchased by Mr. Alger, in whose possession it now is.

Dr. Jackson also presented some of the berries of the plant (*Rhus succedaneum*) which produces the so-called Japanese Wax, and a specimen of the wax thence obtained.

On boiling the berries in water, the wax rises to the surface; it is a concrete volatile oil rather than a wax; it exists under the skin of the berry, in abundant granules containing 14.6 per cent. of the wax. It is not likely that it would prove remunerative to bring so light and bulky a material to this country from Japan, for the purpose of extracting the wax here.

Prof. W. B. Rogers agreed with Dr. Jackson, that this substance is not a wax; its fusing point is 20° lower; it is less plastic and ductile, but equally inflammable; it consists of substances resembling stearine, as does palm oil, with palmitic acid. The wax of bees is more complicated, being an animal secretion and not a vegetable product. According to the last authority, the Japanese wax is almost pure palmitine. The Japanese make ornamental candles of this substance, using paper for the wicks.

Drs. Charles M. Tuttle, of New Bedford, George Suckley, of New York, and F. V. Hayden, of Washington; and Messrs. William Stimpson and Robert Kennicott, of Washington, were elected Corresponding Members.

Messrs. E. S. Tobey, Walter H. Cowing, and Joseph H. Allen, of Boston, were elected Resident Members.

Annual Meeting, *May* 4, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

The Annual Reports of the Treasurer, Librarian, and Curators, with the exception of those of Ornithology and Crustacea, were read and accepted.

The Librarian reported the addition of 75 volumes, and 126 pamphlets and parts of volumes since the last annual meeting. He called attention to the propriety of republishing deficient numbers of the Journal and Proceedings.

The principal addition to the Geological department is the valuable collection of Zeuglodon vertebræ, deposited by C. S. Hale, Esq. of Burlington, N. Jersey.

The principal addition to the Ornithological department is the collection sent by Dr. Reinhardt, of Brazil, numbering over 340 specimens.

An alphabetical catalogue of the genera and species has been made in the collection of Radiata.

The department of Comparative Anatomy contains 693 specimens, viz: 257 crania, 88 skeletons, 172 parts of skeletons, 123 wet preparations, 43 skins, and 10 dried preparations. Many of these are packed away for want of room for their proper exhibition; and most of the valuable specimens are more or less covered with fungoid growths which penetrate and destroy the organic parts of the bones; these growths are caused by dampness and want of light and ventilation, unavoidable in the present state of the building. It is hoped that the future growth of these fungi may be arrested by an acid and alcoholic solution of corrosive sublimate, strychnia and camphor, and that the dampness may be absorbed by chloride of calcium.

In the department of Entomology, the Harris collection makes a most valuable addition.

The Microscopic cabinets, containing the Bailey collection, and that of the late Dr. Burnett, (between 200 and 300 animal parasites,) are in good condition and well arranged. The numerous drafts upon the crude material have so diminished the original amount, that their further consumption must be limited to special and important purposes connected with microscopic researches.

Dr. A. A. Gould presented the report of the nominating committee for officers for the ensuing year, which was accepted. Drs. Bacon and White were appointed Scrutineers, and the following officers were elected :—

PRESIDENT,

Jeffries Wyman, M. D.

VICE-PRESIDENTS,

Charles T. Jackson, M. D. D. H. Storer, M. D.

CORRESPONDING SECRETARY,

Samuel L. Abbot, M. D.

RECORDING SECRETARY,

Samuel Kneeland, Jr., M. D.

TREASURER,

Amos Binney.

LIBRARIAN,

Charles K. Dillaway.

CURATORS,

Thomas T. Bouvé,	*Of Geology.*
John Bacon, M. D.,	*Mineralogy.*
Charles J. Sprague,	*Botany.*
Thomas M. Brewer, M. D.,	*Oölogy.*
Henry Bryant, M. D.,	*Ornithology.*
Thomas J. Whittemore,	*Conchology.*
J. N. Borland, M. D.,	*Herpetology.*
F. W. Putnam,	*Ichthyology.*
Theodore Lyman,	*Radiata.*
J. C. White, M. D.,	*Comparative Anatomy.*
Samuel H. Scudder,	*Entomology.*
Albert Ordway,	*Crustacea.*
Silas Durkee, M. D.,	*Microscopy.*

CABINET KEEPER.

Charles Stodder.

Prof. William B. Rogers stated the results of his examination of the Japanese Vegetable Wax lately presented to him by Henry A. Peirce, Esq. of Boston, and to which reference was made at the last meeting. This substance has the whiteness and apparent purity of bleached beeswax, from which, however, it differs in various particulars both as to mechanical and chemical relations.

At ordinary temperatures this vegetable wax is more brittle and less ductile than beeswax and breaks with a smoother and more conchoidal fracture. Its specific gravity is slightly less, and its melting point, about 127°, is more than 20° lower than the temperature at which beeswax becomes liquid.

Like the latter substance this vegetable wax is separable, by alcohol, into three fatty bodies, of which one is soluble in the liquid at ordinary temperatures, another only in hot alcohol, and a third is insoluble in it at any temperature. An experiment made to determine the proportion of these ingredients in the vegetable wax gave the following result, in round numbers, in 100 parts :—

Soluble in cold alcohol (Temp. 60°)	12 parts.
Soluble only in hot alcohol,	55 "
Insoluble in alcohol,	33 "

According to Brodie, beeswax similarly treated with alcohol yields only four or five per cent. of matter which is soluble in the liquid when cold, and twenty-two per cent. which dissolves in it when boiling, while the remainder amounting to nearly three-fourths of the whole weight is entirely insoluble in this liquid. Of these three ingredients called respectively Cerolein, Cerotic Acid and Myricine, Brodie found the two former, viz : those soluble in cold and hot alcohol, to have the character of fatty acids, while the third or Myricine proved to be a neutral fat, compounded of Palmitic Acid and a fatty base. The three corresponding substances isolated by alcohol from the vegetable wax, differ from these in some of their physical properties, and may, on closer examination, be found to consist wholly or in part of distinct and perhaps new fatty bodies.

The substance separated by alcohol at the common temperature is a soft, scarcely solid fat, which becomes entirely fluid at about 106°. With solution of litmus it exhibits quite a strong acid reaction. The corresponding extract from beeswax, the Cerolein of Brodie, fuses at about 85°, and shows a much feebler acidity.

The ingredient dissolved from the vegetable wax by hot alcohol and separating from the solution as it becomes cool, when collected by filtration and thoroughly washed in alcohol at 60°, was found to have its fusing point at 134°, and to become as liquid as oil at 136°. This substance dissolves readily in alcohol many degrees below boiling. The solution affords with litmus no trace of acid reaction. The corresponding educt of beeswax, the Cerotic Acid, has a much higher melting point, is less soluble, and is distinctly acid.

The solid residuum from which the hot alcohol had ceased to extract anything more, being dried and strongly compressed between folds of blotting paper was found to adhere together very imperfectly, and to be much more brittle than the original wax. Its melting point is about 130°, and at 132° it becomes entirely liquid. The corresponding ingredient of beeswax, consisting chiefly of Myricine, melts, according to Brodie, at 147°.

It thus appears that the vegetable wax under consideration differs from beeswax not only in the proportions of its ingredients as separable by alcohol, but in the physical characters of these corresponding substances, the composition and chemical properties of which can only be determined by a thorough investigation.

In regard to the economical applications of this vegetable wax it may be added that the great readiness with which it is saponified, and the clear and strong light which it yields when burned in the form of candles, give promise that it may ere long become an article of considerable commercial importance.

Dr. C. T. Jackson confirmed the above experiments of Prof. Rogers, and stated that ether extracts a hard dry wax, after alcohol has extracted all that it can; the fat extracted by boiling alcohol is deposited on cooling, so that the alcohol can be used economically over and over again in the process. When dry distilled, a fatty matter passes over, and a tarry matter is left behind. The Japanese make this wax by boiling water; he experimented on wax made by himself from the berries.

Prof. William B. Rogers presented to the Society some masses of Infusorial earth from the Tertiary strata of Virginia and Maryland, and gave a description of the geological and other conditions in which this and the associated deposits exhibit themselves in and near Richmond in the former of these States.

The Tertiary formations which underlie the wide plain extending from the seaboard to the eastern margin of the granitic and gneissoid rocks, approach their termination along this meridian in a series of strata which are separated by only a short interval from the irregular granitic floor. A little further toward the west they reach their boundary, partly by a rapid thinning away and in part by abutting along the hill-sides against the indented shore of these ancient rocks, here rising to the level of the general upland surface.

In the deep ravines leading into the valley of Shockoe Creek, especially on its western side, we meet with several extensive exposures of the Tertiary strata, one of which embraces nearly the whole thickness of both the Eocene and Meiocene formations as locally developed in this neighborhood. In all these localities the *infusorial deposit* is found occupying a position immediately above the upper limit of the Eocene strata or separated from it by a thin layer of whitish or of more or less ferruginous clay. Like the associated beds, it fluctuates in thickness as traced from one neighboring exposure to another, varying from twenty to upwards of thirty feet at the different localities on the north side of the valley, and presenting, where measured some years ago, on the opposite or Church-Hill side, a thickness of nearly fifty feet. In addition to the microscopic fossils, which in a more or less perfect condition make up so large a portion of the mass, this deposit presents a few casts of shells of well known Meiocene forms, of which the Astarte undulata may be mentioned as of most frequent occurrence. It also contains imperfectly preserved remains of a slender creeping plant, as well as fragments of woody stems and branches flattened and converted into lignite and in some cases filled in all directions with the perforations of a Teredo.

The material of the Infusorial stratum is generally of a very fine texture, admitting of being bruised between the fingers into an almost impalpable powder, singularly free from gritty particles. Although usually of a light gray, almost white color, it includes in some localities layers of an ashy tinge, which are, however, not inferior to the rest of the deposit in the abundance of their minute organic forms. It has throughout a tendency to lamination in a horizontal direction, and toward its upper limit this structure is so distinct as to cause it readily to separate in thin crumbly plates. But of all its mechanical peculiarities its great lightness is the most characteristic. From experiments made many years ago, Prof. Rogers found that when pure and quite free from moisture this material in its ordinary state of compactness has a weight only one third as great as an equal bulk of water. The minute siliceous fossils for which this deposit has long been noted, belong, as is well known, almost entirely to the family of Diatomaceæ, and include a very large proportion of Coscinodiscus and allied forms, whose exquisitely thin plates lying in parallel positions in the mass have probably contributed to the laminated structure before referred to. The number of such frustules and other siliceous skeletons in each cubic inch of the pure material can only be reckoned in millions, and a cubic foot would contain a multitude far exceeding in number the entire human population of the globe.

The following description of the series of strata as exposed in the principal ravine before referred to, will serve to illustrate the relation of the Infusorial deposit to the others with which it is associated, and will at the same time illustrate the nature and fossil contents of these Eocene and Meiocene strata.

1. The lowest bed, which is seen resting directly on a soft sandstone and conglomerate, consists of a mixture of sand and clay having a yellowish gray color occasionally mottled with brown, and including little irregular patches of green sand. This stratum is crowded with the impressions of Turritella Mortoni, Cardita planicosta, and other well-known Eocene forms, which are, however, so fragile as scarcely to admit of being preserved. The thickness of this bed varies from six to ten feet.

2. Next above we find a stratum of dark olive or greenish clay mixed with siliceous sand and containing diffused granules and smaller particles of green sand. This bed abounds in the teeth of squaloid fishes, especially of the genus Otodus and Odontaspis, and with Coprolites, mostly small and apparently derived

from fish. Along with these are innumerable casts of Eocene shells, Carditas, Turritellas, Crassitellas, Cythereas, &c. Where it adjoins the subjacent mottled stratum the transition is marked by a thin ferruginous band crowded with impressions of Turritella, &c., which are deeply stained with oxide of iron. This subdivision, where thickest, has a depth of about twelve feet.

3. Resting upon the dark stratum just described is a second arenaceous bed of a light yellowish tint mottled with brown and varied by thin ferruginous layers. This also contains numerous impressions of shells. Some distance up the ravine it exhibits a thickness of about eight feet, but is seen irregularly thinning out toward the lower end of the hollow, where its upper surface bears marks of irregular denudation prior to the deposition of the overlying Meiocene deposits.

4. At the base of the Meiocene strata we find a thin bed of whitish and sometimes ochreous clay mingling towards the top with the lighter material of the *Infusorial stratum*, which here attains a thickness of from twenty to thirty feet. It is this locality that twenty years ago furnished Prof. Rogers the first specimens of Tertiary Infusorial earth discovered in the United States, and led him to the recognition of a similar deposit in the Tertiary of other localities in Virginia and Maryland, which, like that of Richmond, have since become so familiarly known to microscopic observers in all parts of the world.

5. Above the Infusorial stratum, here forming a bench often denuded and in such cases conspicuous from its whiteness, we find a series of strata consisting of various intermixtures of clay and sand, of which the lowest is usually a compact, light colored clay, the next a bluish or grayish, more arenaceous mass, and the uppermost an argillaceous stratum of a light brown and mottled appearance. The highest of these Meiocene strata is overlaid by a deposit of coarse gravel such as forms the usual superficial material of this region in the vicinity of the large rivers. The thickness of that part of the Meiocene which lies between the Infusorial stratum and this surface deposit, amounts, in the neighborhood of the present section, to about twenty-five feet, but at other points where less reduced by denudation it displays a considerably greater mass. Throughout most of these beds the casts of well-known Meiocene fossils are of very frequent

occurrence. Indeed, in some of the layers they are so numerous as to be exposed to view in every mass of the sandy clay which is broken or falls to pieces by its natural partings. Among the most common of these fossils are Fusus quadricostatus, Panopæa reflexa, and many Meiocene species of Pecten, Arca, Crassitella, Cytherea, Venus, Astarte, Turritella, &c. In the lower dark-colored stratum there occur stems of woody plants, which, from microscopic indications, seem to have been coniferous, while in the argillaceous layers both beneath and above, Prof. Rogers has from time to time discovered prints of the leaves of Dicotyledonous plants.

In none of these deposits, whether of Eocene or Meiocene age, do we meet with any remains of the shelly matter which at one time must have formed so large a portion of the mass. In various parts of the Tertiary region where the strata, as in the present case, disclose only the casts, or as it were spectres of shells, the sands and clays are more or less impregnated with sulphuric acid, and present in some of their lower layers diffused particles and even large and well-formed crystals of sulphate of lime. We can therefore have little hesitation in referring the disappearance of the shelly matter throughout this district to the infiltration through these fossiliferous strata of water charged with sulphuric acid, which, gradually transforming the carbonate of lime into sulphate, carried this product downward to be accumulated and crystallized in the lower layers, at the same time leaving the moulds and casts of the shells in so perfect a state as to enable us to trace even their more delicate processes and markings.

The position of these beds along the western margin of the Tertiary plain must be regarded as marking the general direction of an ancient shore line; and the frequent presence of fragments of terrestrial plants in these Tertiary sediments is confirmatory of this view.

It has already been stated, in describing the section on Shockoe Creek, that the lowest layer of the Tertiary is seen in that locality resting upon a soft sandstone and conglomerate. This subjacent deposit shows itself in a like position at several neighboring points, and is evidently the thinning away of a formation, which, farther toward the east, separates the Tertiary from the granite by a much wider interval. As seen in the extensive exposures on the James River for many miles below Richmond, this formation presents a very close agreement with the soft sandstone found on the Rappahannock and Potomac rivers in corresponding positions, and like this has been long since referred by Prof. Rogers to the upper part of the group of Mesozoic strata to which the coal measures of eastern Virginia appertain.

Prof. W. B. Rogers presented, in the name of his brother, Prof. Henry D. Rogers, his extensive and completed work on the Geology of Pennsylvania, and the general Geology of the United States, with maps and illustrations executed in the highest style of art.

The thanks of the Society were voted for the donation.

Mr. Joseph B. Stearns, of Boston, was elected a Resident Member.

The Annual Meeting was adjourned to the next regular meeting.

May 18, 1859. *Adjourned Annual Meeting.*

Dr. C. T. Jackson, Vice-President, in the Chair.

The following communication from Mr. William P. Blake, of Dahlonega, Ga., was read by the Secretary:—

"Observations on the Mineral Resources of the Rocky Mountain Chain, near Santa Fé, and the probable extent southwards of the Rocky Mountain Gold Field."

As the discovery of gold in quantity in the western part of Kansas renders any information which may be given upon the mineral resources of the Rocky Mountain region particularly interesting at this time, I am induced to send to the Society a brief notice of some of the results of a tour of exploration made in 1857, in the mountains of the northern part of New Mexico, near Santa Fé.

The vast extent of country in New Mexico, which remains unexplored, precludes the possibility of presenting even a fair outline view of its mineral resources as a territory. The few facts which I offer must therefore be regarded only as an addition to what has already been discovered, and an indication of what yet remains to reward the labors of the diligent explorer.

First in interest at this time, as bearing upon the extent of the Rocky Mountain gold field, is the gold field of New Mexico, which has been known and worked since 1828. It is confined to the Placer or Gold Mountains, about twenty miles from Santa Fé, towards Albuquerque, and although worked continuously since its discovery, its limits have not been extended by exploration far from the place where the gold was first found. The yield of gold has been chiefly from the placers or washings, and not from veins, and was estimated by Wislizenus, in 1847, to vary from 30,000 to 250,000 dollars a year; but it soon after greatly diminished, until counted by hundreds rather than thousands.

I found these placers to be on the slopes of subordinate or outlying ridges of the eastern ranges of the Rocky Mountain chain, and to be true hill-deposits, affording coarse gold like that from the high placers of California. The "pay gravel" lies deep below the surface, from twenty to sixty, and even one hundred feet, and is generally very rich. Owing to the almost total absence of water, mining and washing have been but imperfectly conducted, and a larger amount of gravel remains untouched. The Mexicans sink circular shafts, like wells, through the soil and alluvions to the gravel, then tunnel upon the bed-rock and take the good gravel to the surface in sacks, cart it two miles to water, and then pan out the gold in wooden bowls or *batéas*. In the winter, water is sometimes obtained by melting snow with heated stones. There are two principal placers, the "Old" and the "New," and at the former there is a small stream or rivulet for a part of the year. These placers are about five miles apart, but there has been very little prospecting to determine their real extent. New Placer is known to be about ten miles long, for the workings or pits have extended over that distance. The gold appears to have washed out of two cañons in the mountain which are near together, and appear to drain but a very small part of the surface. Veins or beds, in the rocks, containing gold, outcrop higher up in the ravines of the mountain. It is remarkable that in one place, at least, gold occurs in strata of quartzose sandstone, probably of the age of the carboniferous, and in great ferruginous beds, rather than in veins. The sandstone appears to have been charged with auriferous pyrites by the decomposition of which gold has been liberated. At other points regular quartz veins bearing gold and pyrites are found, and some of them have been worked at different times for over twenty years. The *Ortiz Mine* has been worked to a depth of one hundred and thirty-five feet, and levels driven for nearly two hundred yards on the course of the vein which is represented to be about six feet thick. The Biggs' Mine, which adjoins it, has been worked to nearly the same depth. In the mountains known as *Los Cerillos*, about eight miles from New Placer, there is a deserted mine, known among the old Mexicans as *La Mina del Oro*, the true character of which could not be well determined. It certainly is very ancient, and there is no record or tradition concerning it, except that the work was done before the Insurrection, which took place in 1680. The principal shaft is over two hundred feet deep, and is cut vertically, with great precision, through solid rock. The sides are very smooth, and it is evidently the work of experienced miners. A stone, allowed to drop vertically, does not reach the bottom for several seconds, and then gives a dull sound as if striking earth, showing that there is no water in the mine even at that depth. There are two other shafts, and they all communicate by galleries in miners' style. In 1834, there was an attempt made to clean out the mine and work it, by a party of Mexican residents of Santa Fé, but without any success, there being no water at the mine or machinery for raising and reducing the ore.

At the placers, large lumps, pepites or nuggets, of gold have been frequently found; the largest, of which I could get reliable information, was worth about $2000, another was valued at $1800, and there have been many worth from fifty to eighty. At Old Placer, none larger than about eighty pennyweights had been found. The gold from New Placer is remarkably black and ill looking on the surface, but is very fine, being worth twenty dollars an ounce. Only sixteen dollars an ounce is paid for it to the Mexicans at the mines by the traders. When these miners are employed by the day they receive from sixty to seventy-five cents.

The Gold Mountains and Placers are about three hundred miles south of Pike's Peak, and there is little reason to doubt that gold will be found at intervals, if not in an almost continuous belt, over this entire distance. The New Mexican gold field is probably much more extensive than is generally supposed, and when it is thoroughly prospected many more rich placers will doubtless be found. The geological indications in the mountains north of Santa Fé, judging from specimens brought to me, are favorable to the presence of gold, and are more like the auriferous rocks of other gold regions than the formations at the Placer Mountains.

The observation of the occurrence of gold in beds of sandstone is not only interesting to science but of considerable practical importance. The erosion, or breaking down of such a bed, would supply gold to a stream or deposit without its being accompanied at the same time by the usual beds of quartzose gravel, the soft friable sandstone being completely broken up into sand by attrition. Thus, rich deposits may exist on the hill-sides without any indication of their presence by beds of rolled gravel or broken fragments of veins on the surface. Mr. Green Russell, an experienced placer miner and mountaineer, who made an extended tour through the new gold region of western Kansas last year, informs me that he has observed such conditions; having found rich deposits of gold without much gravel, and scarcely any quartz. From the same authority, I learn that gold occurs in considerable quantity upon the Arkansas River, in extremely thin scales, as low down as the crossing of the old Santa Fé road, near old Fort Atkinson. This is far out upon the broad plains, and below any coarse alluvions. The quantity of gold increases as the river is ascended, and the best prospects were obtained at the Pueblo above Bent's Fort. The Arkansas, near this point, has several forks or branches heading in the mountains to the southward, in the vicinity of the Spanish peaks, and there is much reason to believe that gold will be found there. A connecting link between the New Mexican gold field and that of Pike's Peak would thus be formed. A sample of the Arkansas River gold, brought in by Mr. Russell, yielded .971 by assay at the Dahlonega Branch Mint, being worth about twenty dollars an ounce, or nearly the same as the New Mexican gold. It would thus appear that the Rocky Mountain gold is of superior quality, the average of the California gold being from .875 to .885, and the Australian .960 to .966.

Next to the gold, but probably of greater importance to the country, is the existence in the Rocky Mountain chain of beds of coal of the carboniferous period, corresponding in kind to those of the great Appalachian coal-field. Beds or layers of coal or lignite have at various times been reported to exist in the mountains, but their age or character was unknown, but supposed to be of a period more modern than that of the true coal. I was able to determine by an abundance of fossils, that the true coal measures are developed there, having found not only shells but fossil ferns identical with species found in the coal measures of Missouri and Ohio. Seams of bituminous coal and thick beds of black shales occur only one mile from Santa Fé, and at other places in the vicinity, and I have no doubt that explorations would detect valuable beds at various points north and south along the whole Rocky Mountain chain through New Mexico and Kansas into Nebraska and beyond.

Twenty miles from Santa Fé, and not far from the gold mines, there is a bed of hard coal, specimens of which I examined and found to be true anthracite or debituminized coal, apparently equal in quality to the anthracites of Pennsylvania. The presence of beds of anthracite coal in the Rocky Mountains is of great national importance in many points of view. One of the great questions in connection with the proposed construction of a railroad to the Pacific has been,—Where shall appropriate fuel be obtained? In these beds of anthracite coal we have a store of the most compact fuel known, at a point nearly midway between the Mississippi and the Pacific. Here, then, is one great reason for the construction of a central road to the Rocky Mountains near Santa Fé, coal not having been found, and probably not existing, in workable beds in the lower and porphyritic ranges of western Texas and southern New Mexico. Even if wood were abundant in the mountains (which it is not, except at great elevations,) the coal is much more accessible and desirable. It is valuable not only for railway purposes, but to the inhabitants of the region, and is specially important for mining and metallurgical operations.

There is great reason to believe that the Rocky Mountain chain is rich in silver ores in the form of argentiferous galena. Stevenson's mines, near Franklin, (El Paso,) have long been known and are very rich. Although worked very irregularly, and the ores smelted in the rudest manner, large amounts of silver have been extracted, while the lead and copper which occur with the silver have been totally disregarded and thrown away. Similar ore is said to occur in the Sandia mountains, near Albuquerque, where there are very ancient but now deserted mines. In the group of mountains known as *Los Cerillos*, fifteen miles from Santa Fé, I examined two or three argentiferous veins, the principal minerals being galena and blende with copper and iron pyrites. These veins occur in a porphyritic rock and are very promising in their appearance. They have been worked upon slightly, and some of the excavations appear ancient. The Mexicans say they were made before the Conquest.

Of copper ores, there are several localities. Sulphuret of copper, with blue and green carbonates, occurs in the Placer mountains. Native copper and red oxide of copper are found near Jemez, in the valley of the Rio Grande. The specimens from this locality are peculiarly rich and promising, and much resemble the red oxide and native copper of Arizona, which occurs in such abundance.

Magnetic iron-ore, exhibiting polarity very strongly, is abundant in the mountains near the gold mines, and at some future day may be profitably worked for iron and steel, as coal and limestone are abundant in the vicinity. Specular iron is reported to exist in veins or beds, but whether it is abundant or not was not ascertained.

In addition to the useful metals and ores, there are many valuable minerals and gems. The much prized Chalchihuitl (chal-chee-wee-tee) of the ancient Mexicans, held in the highest esteem by the Montezumas at the time of the Conquest by Cortez, was obtained in the mountains about ten miles from the gold placers.

This stone is a variety of turquoise, and the locality is the only one known in America. At Fort Defiance the Navajo Indians bring in rolled fragments of garnets, perfectly clear and transparent and of a most beautiful color, fully equal if not superior to those from Bohemia. Some of them are very large, and of considerable value. Beautiful chrysolites have also been obtained there; several specimens were shown to me in Santa Fé. Diamonds have been reported, but as yet there is no good reason to credit the statement.

It will thus be seen that the mineral resources of the Rocky Mountain region are extensive and of a character to render it in a great measure independent of distant sections of the country. Its rapid settlement and the explorations which must result from the great emigration to the newly discovered placers, will not fail to bring to light many new localities of valuable minerals, and thus hasten the organization of a new and powerful State.

Dr. Jackson observed, that the most natural geological route for a railroad to the Pacific, seemed to him from New Orleans by Texas and New Spain to Mazatlan; a great part of the Atlantic portion from Portland to New Orleans is already built; in Mexico and New Spain there is a great extent of level table-land,—such a route, along the coast of the Atlantic and the Gulf of Mexico, would be the shortest and most direct, not only from New England but from the region of the great lakes.

Dr. Jackson announced the decease of the celebrated and venerable Alexander Von Humboldt, at Berlin, in his ninetieth year. He alluded to the principal events of his life and of his scientific career; to his exact and extensive knowledge in every department of natural science; to his travels, in which he collected a vast amount of specimens and accumulated a mass of facts, which he arranged in the best possible manner from his comprehensive knowledge of natural science. His industry was untiring, and his information on general subjects of natural science probably greater than that of any other man; he was the originator of the present system of magnetic observations, and first drew attention to isothermal lines, classifying countries by their climates; he collected an astonishing amount of facts in natural science, which have served as inexhaustible supplies for subsequent observers.

Mr. J. Hale Abbot alluded to the general literary culture, and to the remarkably well-balanced mind of Humboldt. Most men, eminent in science, he said, are one-sided in their mental constitution, but Humboldt cultivated his faculties in all directions, and the marks of a refined taste in literature, as well as of scientific culture, appear in all his writings. Hence the accuracy of his judgment, the trustworthiness of his conclusions on scientific questions, and the general unhesitating acceptance of his well-matured opinions.

Mr. Abbot presented the following resolutions, which were unanimously adopted:—

Resolved: That the members of the Boston Society of Natural History have learned with profound grief the death of the illustrious Naturalist and Philosopher—Alexander Von Humboldt.

Resolved: That we cherish a high sense of the preëminent amount and value of the services rendered by him to the cause of science, during a long life actively devoted to the extension and diffusion of knowledge of the phenomena and laws of nature.

Resolved: That, in token of our condolence, these resolutions be transmitted to the family of the deceased.

The Secretary made a communication from U. A. Boyden, Esq. of Boston, requesting the Society to consider the expediency of examining the so-called "ice stratum" in Brandon, Vermont, which has recently been referred to in the newspapers. In excavating a well, on a tolerably level plain, at a depth of fifteen feet through sand and gravel, the workmen came to a layer of frozen coarse gravel interspersed with lumps of clear ice; since the digging of the well, the surface of the water, at the depth of thirty-five feet, freezes over every night.

Mr. Boyden offered to pay a considerable portion of the expense of a commission to examine the locality. The following gentlemen were appointed a committee to take charge of the subject, and make all necessary investigations: Messrs. Bouvé, W. B. Rogers, and C. T. Jackson.

The Curator of Entomology made a revised report of the collection of Insects belonging to the Society, and especially on the addition made by the purchase of the cabinet of the late Dr. T. W. Harris, and his valuable manuscripts.

The department of native insects in Dr. Harris's cabinet has a peculiar value as containing many typical specimens of species described by himself, Say, and other naturalists, and also from its completeness in all its parts. It contains—

4838	specimens	of	2241	species	of	*Coleoptera.*
181	"	"	76	"	"	*Orthoptera.*
620	"	of about	300	"	"	*Hemiptera.*
267	"	of	146	"	"	*Neuroptera.*
1125	"	"	602	"	"	*Hymenoptera.*
1931	"	"	900	"	"	*Lepidoptera.*
796	"	"	395	"	"	*Diptera.*

In all, 9758 specimens of 4660 species. This does not include a considerable number of unclassified specimens. The cabinet is in good condition. The Curator suggested the purchase of his scientific library, rich in entomological works not elsewhere to be met with in this vicinity, and forming a most desirable accompaniment to his collections.

Mr. Stodder exhibited a specimen of polished encrinal limestone, from the vicinity of Davenport, Iowa.

Mr. F. B. Meek, of Washington, D. C., was elected a Corresponding Member.

The meeting, being an adjournment of the Annual Meeting, was again adjourned to the next regular meeting.

The Corresponding Secretary read the following letters, which he had recently received, viz:—

From Dr. C. W. Tuttle, April 19; W. P. Blake, Dahlonega, Ga., April 23; Dr. George Suckley, New York, May 11; and William Stimpson, Washington, May 11, in acknowledgment of their election as Corresponding Members; New York Lyceum, March 12 and 23; Zoölogisch-Botanischer Verein, Wien, March 15, 1858; Société de Geographie, Paris, Nov. 20, 1858; Bibliothekariat der K. Bayerischen Akademie, München, Dec. 29, 1858; Naturforschende Gesellschaft, Emden, Dec. 16, 1858; Verein für Naturkunde in Nassau, Wiesbaden, Dec. 1, 1858; Académie Royale des Sciences de Stockholm, Nov. 15, 1858, and William Sharswood, Esq., Philadelphia, March 15 and May 5, acknowledging the receipt of the Society's publications; the American Association for the Advancement of Science, March 26; Cambridge Philosophical Society, Nov. 1858; Verein für Naturkunde, Wiesbaden, Dec. 1, 1858, and the Académie Royale des Sciences de Stockholm, Nov. 15, 1858, presenting their various publications; Librarian of Bowdoin College, April 5, asking that deficiencies in their set of the Society's publications may be made good to them; H. Davis, McGregor, Iowa, concerning collections for the Society; and the K. Preussische Akademie, Aug. 12, 1858, acknowledging the receipt of the Society's publications, and presenting its own.

The following Standing Committees were announced as having been chosen by the Council:—

On the LIBRARY. Messrs. Dillaway, Sprague, and Bacon.

On PUBLICATIONS. Messrs. D. H. Storer, Dillaway, S. L. Abbot, Wyman, and Kneeland.

On FINANCE. Messrs. Bouvé, Barnard, and Binney.

June 1, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Mr. Charles Stodder read portions of a letter, dated May 23, from Brandon, Vt., in reference to the frozen well recently opened there :—

The well is near the foot of a hill, about half a mile from Otter Creek, on its eastern side, and on the eastern slope of the hill. The hill appears to be composed mainly of coarse gravel, and from its summit about half way down has a steep pitch, below the middle, sloping very gradually to the sand plain on which the village of Brandon is located. The well was dug in November last, from 30 to 35 feet deep, all the way through clear gravel varying in size from a nut to an egg. At the depth of 15 feet a mixture of gravel and ice was reached, which extended 15 feet more in depth, and below this the water was found, the clear ice above the water being about two inches thick ; the water freezes over if it is left undisturbed 12 hours, and the sides of the well, for a considerable distance above the water, sparkle with frost.

Dr. Jackson observed, that a frozen well at Owego, N. Y., is described in Vol. 36 of Silliman's Journal ; and also another near Hartford, Ct., in the Proceedings of the American Association for the Advancement of Science, at the meeting in Providence, R. I., in 1855.

Mr. John H. Blake was added to the Committee on the investigation of the Brandon Well.

Dr. Brewer remarked, that at a previous meeting (see p. 21 of the Proceedings, Vol. 7,) he said, on what he believed good authority, that a specimen of Bachman's finch (*Peucæa æstivalis*, Cab.) had been shot in Berlin, Mass ; subsequent examination of the bird proves it to be Henslow's bunting, (*Coturniculus Henslowi*, Aud.,) a species whose northern limit has been generally supposed to be the latitude of Washington, while Bachman's finch is not known to come so far north even as that.

Dr. C. T. Jackson presented specimens of casts of *Paradoxides*, from Braintree, Mass., and from St. Mary's Bay, Newfoundland ; both of which seem to be the *P. Harlani.*

The rock which contained the latter specimen is water-worn and boulder-like, weighing between 2 and 3 cwt.; it is a dark blue calciferous slate, consisting of about $\frac{1}{3}$ carbonate of lime. The specimen lies across the line of stratification, instead of in it, and consequently the head appears crushed, somewhat injuring its symmetry. The dimensions are,—

PARADOXIDES HARLANI ?

	ST. MARY'S BAY.	BRAINTREE.
Length	10 inches	$8\frac{1}{2}$ inches
Width	5 "	4 "
Articulations	20	20
Width of body	$1\frac{1}{2}$ "	$1\frac{1}{4}$ "
Width of ribs	1 inch	$1\frac{1}{4}$ "
Number "	24	24
Lateral appendages	1 inch	1 inch

Head compressed by shrinkage of strata.

Dr. Jackson observed, that he long ago expressed the belief that the borings, which have been extensively made in Maine, in the vicinity of Pembroke, in search of coal, would prove fruitless. A Portland company are, however, actively engaged in the search, and he had recently received specimens of the rock containing apparently stems of *fucoides*, fern-like impressions, and others resembling the markings of *lepidodendra*, which had somewhat shaken his former opinion.

Mr. Theodore Lyman gave an account of the habits of some animals recently observed by him at West Yarmouth, Mass.

Syngnathus Peckianus.—Pipe-fish. Taken in shallow water among dead eel-grass and sea-weed. Has a most extraordinary power of moving its eyes, the balls of which may be turned until, instead of lying parallel to the length of the body, they stand at an angle of at least 50° to it. Moreover, the balls are usually moved independently of each other; and the two seldom have the same position. They move continually and in short jerks, and, as they stand well out from the head, their range of vision must be great. The movement of the body proper is somewhat like that of an eel, but rather stiffer and less rapid. It moves by vibratory undulations of the dorsal fin, running from the front backwards, while at the same time, the small pectorals vibrate with great rapidity. When at rest, the dorsal fin is laid down on the back. When alarmed, it vibrates its fins and wriggles the body forcibly.

Atherina notata.—Sand-eel. A beautiful silvery sardine. Running in small schools, on a clean sandy bottom, and in only a few inches of water.

Fundulus pisculentus. The commonest fry hereabout. Plenty in all the marsh ditches and runs.

Hydrargira flavula. Basse fry. A striped little fish; not seen in great numbers.

Cyprinodon ovinus. Small thick minnow. Not common.

Alosa vulgaris. Taken in seines; crammed with spawn.

Spinax acanthias. Taken in great numbers on the bar, filled with young. Also said to be breeding in the autumn.

Platyonychus ocellatus. Sand crab. Very abundant in shoal water with sandy bottom. They are very quick and ferocious. When pursued they retreat sideways; but, if hard pressed, they suddenly back under the sand. When taken they bite and struggle fiercely. The females were charged with eggs, already segmented.

Libinia canaliculata. Common among the weeds in shallow water. Often of great size. Very sluggish and stupid. It moves *forward* slowly, and, if taken, makes little attempt to defend itself. Always seen in the neighborhood of any dead animal, on which it feeds, in company with *Buccinum obsoletum.* No eggs seen.

Palemon vulgaris [?]. Gliding about in ditches in large numbers. Sometimes they threw themselves forward with a sudden jerk.

Eupagurus pollicaris. Abundant in shallow water, on the beach. Lives generally in shells of *Pyrula* or of *Natica.* In respect to the organs of the mouth, which continually vibrate when the animal is active, they are, 1st. The tip joints of the palpi of the 5th and 6th pairs of jaws. 2d. The whole of the 3d pair of jaws; each of which is in the form of a lobed, flattened, and almost membranous plate, and, of this the true jaw moves rapidly in a lateral direction, while the palpus, lying horizontally just at the mouth of the branchial chamber, flaps briskly up and down to renew the water for respiration. 4th. The interior pair of antennæ alternately nod up and down. By all these motions a series of currents is kept up. The interior antennæ and eyes are occasionally brushed with the larger pairs of jaws, somewhat in the manner of a fly. The fifth pair of legs on the body are used to clean out the branchial chambers. They are, from time to time, thrust into the branchial chamber from behind, and are there moved about and then withdrawn. The females had segmented eggs, carried in a bunch on the left side of the tail.

Gelasimus vocans. In immense numbers, both in ditches and on flats of damp sand, where they make holes. Some were digging these holes, and the work seemed chiefly done by the males, who, indeed, appeared more active than the females. In beginning the hole, they simply thrust their legs into the sand and then crowd themselves in sideways; but, when the hole gets deep, they bring out armfuls of sand, which they leave near the mouth, and then return for more. Some seemed to collect bits of sea-weed, &c., to line their burrows with. The legs used in digging and in carrying the sand were the four on the side of the body opposite the big claw. They always went into the burrow with the big claw last. In walking, two alternate legs on a side are moved simultaneously. There were generally a male and a female in each burrow. The males had a singular habit of rearing up for a moment on their hind legs, and holding up their claws and other legs as high as possible, as if to enjoy the breeze. Saw none fight, except one male, who tried for a long while to get another out of his burrow, by seizing him with his big claw and dragging him with all his might. No females with eggs noticed.

Pilumnus Harrisii [?]. Among sea-weed, &c., in shallow water; pretty abundant. No females with eggs seen.

Eupagurus longicarpus. In little shells.

Idotea cœca [?]. Little isopod, brown-olive or bright green. Among sea-weed in plenty.

Melampes (Conovulus) *bidentatus* [?]. In great plenty on sea-weeds and marsh grass along the ditches.

Crepidula fornicata. In great numbers on old shells, generally those occupied by Eupagurus; the smaller are often sticking to the larger. The expanded animal has two snail-like horns with eye-specks at their bases, and, between them, a pair of lobes (tentacles?) The front part of the body and head have the form of a rather thin plate of tissue, which is very movable; while the sucking-disk rests on the "step" in the shell, and is very thick and muscular; the front edge of the disk is prolonged, in the shape of a movable flap. Round the edge of the shell runs the mantle, which may be considerably contracted. The gills lie, in a sheet, on the inside of the roof of the shell. The crepidulæ were laying eggs, which adhered in clusters to the surface on which the animals lay. These clusters contained a bunch of transparent sacs, each of which was full of embryos. These embryos, before leaving the sac, have an active motion. They take on the form of little bags tied, as it were, near the top; the bag itself is filled with yolk-cells, while the loose flaps above the constriction, are bordered by rows of vibratile cilia, which create brisk currents and serve to move the embryo. When the *crepidula* is at rest the front edge of the shell is a little raised and the tentacles thrust a little forth. They move slowly from time to time.

Pecten concentricus.—Scallop. In shallow water on a sand bottom. Lies usually with its valves but little open; but, from time to time, it slowly opens its valves quite wide, as if gaping, and then shuts them with a sudden clap, squirting the water in all directions. The eye-specks, in a good light, shine with a green metallic lustre. The gills, which are very delicate, may be contracted, by transverse muscles, like a ruff, or they may lie flat and extended. The mantle, at the edge, is turned up, so as to hang down from each valve, like a little veil. On the edge of the mantle are numerous fringes, while next the margin of the shell are eye-specks and a double row of very short, bead-like fringes. The liver is very dark green. A single very stout adductor. No eggs noticed. The color of the shells varies from bright orange through brown orange to brown, white with brown markings, and lemon colored.

Buccinum obsoletum. In myriads on the flats, &c. Very plenty on dead fish, &c.

Natica heros. Apparently not so plenty as *N. duplicata*, which is the more southern species.

Pyrula canaliculata.—Wrinkle. This is about the northern boundary of this species. It goes to Charleston, S. C., to Florida, &c.

Mya arenaria, is sometimes cast alive, by the tide, into ditches.

Polynoe. Found among sea-weed. The scales on the back come off very easily.

Hydractinia, in great beauty and plenty. Incrusting such dead shells as *move;* i. e., those of hermit-crabs. There were observed medusæ buds on them.

Dr. Kneeland presented a specimen of *Cordiceps Carolinensis*, from West Roxbury, Mass., in which the fungus, two inches long, grew from the under surface of the caterpillar between the head and the first segment of the body. Also specimens of the apple and peach borer, from Littleton, Mass.

Mr. Stodder read a paper from Mr. Arthur M. Edwards, of New York,

ON THE DIATOMACEOUS FORMS CONTAINED IN A PEAT MARL FROM MILWAUKEE, PRESENTED TO THE SOCIETY ON MARCH 16, 1859.

Having been requested by Charles Stodder, Esq., to make a microscopical examination of a specimen of "Peat marl," from Milwaukee, I herein present the results :—

The marl is of a gray color, and much charged with calcareous matter, resulting from the freshwater shells deposited with it, many of the smaller species of which still remain entire. On acting on it with strong boiling nitric acid, everything is dissolved, except the silica present either as sand or the shells of Diatomaceæ, leaving an almost colorless residue. When this is examined by means of the microscope it is found to consist, for the most part, of the remains of freshwater Diatoms, associated with sand and spicules of freshwater sponges in small quantity. This marl is apparently of recent formation, and belongs to the class of deposits in the course of deposition at the bottom of all our ponds and lakes.

An extensive layer of similar material was lately brought to light at Baisley's pond, about two and one half miles from the town of Jamaica, on Long Island. About *two millions of square yards* of this peat were thrown out at this place, and it consists, for the most part, of one species, *Himantidium arcus*.

A similar deposit was discovered by the late Professor J. W. Bailey, at West Point, New York, and specimens have been received from Bemis' Lake, N. H. The discovery of these deposits confirms the opinion of Professor Bailey, expressed at the time of the finding of the West Point layer, that similar ones are to be found under all our ponds and marshes. The species found in the Milwaukee marl are all common freshwater ones, and are as follows:—

Amphora ovalis,	*Himantidium bidens,*
Cocconeis placentula,	*Navicula affinis,*
Cocconema cymbiforme,	" *cuspidata,*
" *cystula,*	" *firma,*
" *lanceolatum,*	" *inflata,*
Cyclotella Kützingiana,	*Nitzschia linearis,*
Cymatopleura elliptica,	*Odontidium mutabile,*
Cymbella cuspidata,	" *tabellaria,*
Epithemia gibba,	*Pinnularia acuta,*
" *granulata,*	" *oblonga,*
" *turgida,*	" *viridis,*
Fragilaria capucina,	*Stauroneis phœnicenteron,*
Gomphonema acuminatum,	*Surrirella nobilis,*
" *constrictum,*	*Synedra capitata,*
" *dichotomum,*	" *longissima.*
" *vibrio,*	

Making in all 31 species, of which the following are common in this deposit:—

Cocconeis placentula,	*Epithemia turgida,*
Cocconema cymbiforme,	*Gomphonema constrictum,*
" *cystula,*	*Pinnularia oblonga.*
Epithemia granulata,	

The two species, *Cymatopleura elliptica* and *Surrirella nobilis,* were only found in fragments.

Mr. Stodder alluded to Diatoms found by him at the Cambridge brickyards, in which distorted specimens seemed to be the rule instead of the exception.

M. A. Daubrée, of Strasburg, and M. A. Delesse, of Paris, France, were elected Honorary Members.

June 15, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Dr. C. T. Jackson, for the Committee on the frozen well at Brandon, Vt., read a report by Mr. Blake and himself, as follows:—

Your committee, appointed to examine the frozen well in Brandon, Vermont, have attended to their duty, and beg leave to report progress. On the 10th of this month, two members of the committee visited Brandon, and made their researches on that day, and on the 11th inst. They examined the persons who saw the well dug, and the owner of the property, and learned all the facts known to those parties. They also made as thorough a geological examination of the locality and its vicinity as was in their power, during this short visit, surveyed the premises, experimented on the temperature of the water of the well in question, and on that of the neighboring springs and wells, and made arrangements for further researches. In this examination of the locality, the committee were aided by Messrs. Palmer, Wiggins, and Strong, of Brandon; the people of the village manifested much interest in our researches, and offered to aid us in future operations.

The frozen well is situated about half a mile west of the Brandon House, on the side of a moderate elevation which is called the Hogback by some people, and Prospect Hill by others. It is on the estate of Abraham Trombley, and was dug in November, 1858.

From persons who were present when the well was sunk, we learned that after sinking through the soil, about twenty feet, they came to frozen earth, consisting of coarse gravel, rounded pebbles, and lumps of clear ice, from the size of an egg to that of a twelve pound cannon-ball, and that this frozen stratum was between twelve and fifteen feet in thickness. Mr. Strong, one of the nearest neighbors, who saw the well every day, brought lumps of the frozen gravel to the village, and showed them to his friends.

During the past winter and spring, this well has given Mr. Trombley much trouble, owing to its freezing over every night, so that he was obliged to send his boy down in the bucket to cut through the crust of ice, in order to be able to draw water for family uses. This boy has become so expert in this service, as to be quite useful to the committee; and he readily went down into the well for us, and cut off the ice from its sides, while we were making our examinations.

We sent down a candle and illuminated the well, so as to see the crust of ice on its sides, where he had broken it off with the hammer, and drew up the pieces of ice in the bucket. We found that this crust extends from the surface of the water, which is $2\frac{1}{2}$ feet deep, to the height of five feet, and is of considerable thickness.

The water which supplies the well comes in from three different directions, under the frozen stratum, and the sand at the bottom of the well is not frozen, and water was free in it when the well was first sunk.

The water which spatters up against the sides of the well, and that which runs down from above, freezes on its sides near the bottom, showing that the temperature there must be considerably below the freezing point of water, for thawing ice could not freeze water of a more elevated temperature.

On drawing buckets of water from the well, and immediately taking its temperature with well proved Centigrade thermometers, of which we had three, we found that the temperature of the water from the well was $\frac{1}{2}°$ Centigrade, while the air in the bottom of the well stood at 2°, and the outside air at the surface stood at $9\frac{1}{2}°$ C. These experiments were several times repeated, with the same results. We next made an examination of the nearest wells and springs in every direction around this well. A spring, which comes to the surface a few rods northwest from the well, has a temperature of 11° Cent. Mr. Strong's well, a few hundred yards to the north of it, is 15 feet deep, and the water drawn from it had a temperature of 8° Cent. Mr. Clarke's well, in a field a few hundred yards from the gravel bed, had a temperature of 6° on the 11th of June, that of the atmosphere at the time being 7°. This well is 19 feet deep, and was sunk in sandy soil. A spring, a few hundred yards southwest from Trombley's, had, on the 11th, a temperature of 9° Cent., that of the air being $9\frac{1}{2}$° Cent. These springs and wells are on opposite sides of the frozen well, and show that they are not influenced by the cold stratum, which, so far as we can learn, is quite limited. Its precise extent we do not yet know, and it will be subjected to further researches, by digging or boring into the soil in the vicinity.

Mr. Trombley's well is 34 ft. 4 in. deep, and has 2 ft. 4 in. of water in it. The diameter of the well is about three feet; it is stoned up properly with rounded bowlders of limestone, and has a curb around the top; a marble slab, with a circular hole eighteen inches in diameter through it, covers the well, while the windlass is covered with a roof made of a couple of boards nailed together to keep the rope from exposure to the weather. These coverings, of course, stand in the way of radiation of heat from the bottom of the well into space, hence the cold cannot arise from radiation of heat. This we have directed to be proved, by covering the well closely with blankets. Mr. Wiggins has promised to take charge of this experiment.

After making these researches, we examined the geological structure of the soil and rocks around and near the well, levelled up to the top of the hill, and measured the distance and ascertained the slope of the strata of sand and gravel, which dip toward the well, and undoubtedly form the soil through which the well was sunk. To the top of the hill, where the gravel bed exists, is 45 feet from the top of the well, and 80 feet from its bottom. The slope of the hill is 6° and toward the well, while the strata of sand and gravel, at the outcrop, appear to have a rather steeper dip in the same direction. The distance from the well to the gravel bed is 450 feet, and its direction is N. 50° west from the well.

On examining the section of the soil exposed at the gravel bed on the road side, we observed that the lowest stratum exposed is made up of rounded and water-worn stones, consisting chiefly of the blue and gray limestone of the country, but mixed with those of a dark granite or sienite and quartz, which are certainly drift bowlders and from a distance. There is a stratum of sand over the pebbles, but it is quite disturbed, and varies in thickness from two feet to eight inches in different parts of the exposed section. Over this is a layer of fine clayey sand, having more distinctly the appearance of an aqueous deposit, and upon this is the usual soil of the country, consisting of brown loam, somewhat sandy in its character. On traversing the country to the northwest of this gravel bed, we found extensive ledges of naked blue and gray limestone rocks, the surface of which bore strong marks of aqueous abrasion, and in many places deep holes have been made in the rocks, by the action of water, and perhaps of drift bowlders. Loose rounded rocks of granite, sienite, and quartz, strangers to this region, occur scattered over the surface of the ledges, and are a portion of the northern drift deposit.

Your committee reserve their opinion as to the cause of these phenomena until they can gain more light on this very interesting subject, and hope to have occasion to report further progress some time during the summer, when they shall have made more extended researches, and visited other localities, where frozen wells are stated to exist.

For the committee,

Charles T. Jackson.
John H. Blake.

Prof. W. B. Rogers described in this connection the so-called natural icehouses in Virginia; in these cases the ice penetrates the large interstices of the rocks during winter, and the natural covering of the soil, a poor conductor of heat, protects from the heat of the sun in summer. He observed that it was important to consider the mean temperature of the place in explaining the phenomena of frozen wells; the mean annual temperature of Brandon is only 45° F.; of the winter 20°, of the spring 40°; giving for the winter and spring a temperature of 30°, or 2° less than the freezing point of water—in fact, at about the depth of 30 or 40 feet, a reversal of the seasons takes place, so slow is the progression of temperature downward. The access of external air is also important; the temperature of the air in winter at the bottom of this well must be very low; the lateral perforation of this low temperature ought to be traced; the law of progress of temperature from the surface downward in this special locality should be ascertained. So that the question of explanation becomes very complicated.

Dr. Bryant presented a number of valuable specimens of natural history which he had collected in the Bahama Islands during the last spring. He remarked that all the islands seem to be composed of the same limestone, which the sea is gradually undermining and washing away. He found no fossil shells except of such species as now exist on the islands. The soil in many places contains great quantities of oxide of iron; also incrusting the rocks in various places, the presence of which substance he was at a loss to account for. It is generally believed and stated that the gulf weed is seen always floating, and that the place of its growth is not known; he had found it growing all over the Bahamas, attached to rocks like any other sea-weed. He presented many fine specimens of Gorgonia, and of sponges, of the latter of which many varieties were shown growing together. He found no fringing coral reef in the part of the Bahamas visited by him, though he had sailed many hundred miles among them in various directions. He presented a large collection of plants and fungi, and of land and marine shells and crustacea—also a large and valuable collection of fishes, containing many rare and some new genera and species.

Mr. Putnam observed, in regard to the fishes, that they presented a remarkable resemblance to the fauna of the Sandwich Islands.

Prof. Rogers offered an explanation of the occurrence of the ferruginous matter with carbonate of lime, by reference to the ferruginous sand over marl beds, so common in the Southern States; in this there are many fossil specimens in which the petrifying agent is oxide of iron. This would suppose a state of things in the Bahamas, when the iron was there, very different from what is seen now; a very slight proportion of iron, however, would sift out the carbonate of lime, and the iron remaining behind would in course of time produce a large percentage where it originally existed only as 1 or ½ per cent.

Prof. Rogers exhibited specimens of the supposed coal-bearing rocks of Maine, in which was an impression closely resembling *Cyclopteris Hibernicus*, so common in Great Britain. He was of opinion that these rocks of Perry, Me., belong to the sub-carboniferous series, so extensive in Ireland—they are abundant not only in New Brunswick and Nova Scotia, at the depth of several thousand feet (and containing the famous asphaltic coal); but throughout all the Appalachian chain. They are below the productive coal series, yet in some cases they do contain workable coal seams two, three, or five feet in thickness.

Prof. Rogers also exhibited a geological survey of Newfoundland, made by Mr. Jukes in 1824, interesting in connection with the specimens of *Paradoxides* recently found there. Specimens sent to England had been named *P. noviapertus*, but this must be given up for that of *P. Harlani*, bestowed upon the same fossil, described many years ago by Dr. Harlan of Philadelphia.

Dr. Jackson observed that he had traced the rocks of Perry, Me., to rest directly upon Silurian rocks.

The Treasurer's Report, in regard to discharging the debt of the Society, was read and accepted.

Dr. Marcus B. Leonard, of East Boston, was elected a Resident Member.

DONATIONS TO THE MUSEUM.

April 6, 1859. Specimens of lava, from Mauna Loa, Sandwich Islands, eruption of 1856; by Dr. C. F. Winslow. Three species of *Melania*, and two of *Helix*, from the Sandwich Islands; by James Lewis. *Echinopora*, from Singapore; by Theodore Lyman. *Cottus Groenlandicus*, *C. Virginianus*, *Sebastes Norvegicus*, *Gasterosteus quadracus*, *G. biaculeatus*, *G. occidentalis*, *Perca flavescens*, *Fundulus pisculentus*, and *Hydrargyra flavula*, from Salem, Mass.; by Dr. R. H. Wheatland.

April 20. Berries of *Rhus succedaneum*, from Japan; by Dr. C. T. Jackson. Horned lizard, from Texas; by Dr. L. M. Sargent. Clay stones, from Rensselaerville, N. Y.; by Edward Renouf.

May 4. Sandstone, from Pepperell, Mass.; by T. J. Whittemore. Tertiary infusorial earth, from vicinity of Richmond, Va., and *Scolithus linearis*, from Richmond; by Prof. W. B. Rogers. Chameleon, from Madagascar; by Benj. F. Stevens.

May 18. Thirty-seven species of shells, from Bay of Cumana and Hayti; by Dr. A. A. Gould.

June 1. Casts of *Paradoxides Harlani*, from Braintree, Mass., and from St. Mary's Bay, Newfoundland; by Dr. C. T. Jackson. *Eupagurus Bernhardus*, from Nahant; *Clibanarius vittatus*, from Florida, and *Branchipus*, from Salem; in exchange with Essex Institute. *Cordiceps Carolinensis*, from W. Roxbury, and specimens of the apple and peach borer, from Littleton, Mass.; by Dr. S. Kneeland, Jr.

June 15. An extensive collection of fishes, crustaceans, reptiles, shells, and marine growths, from the Bahama Islands; by Dr. Henry Bryant. *Clibanarius vittatus*, from Charleston, S. C.; *Eupagurus longicarpus* and *E. pollicaris*, from Nahant; *Cenobita Diogenes*, from Hayti; *Palemon vulgaris*, from Salem; and *P.* ———, from Africa; in exchange with Essex Institute. Velvet-spotted spring-beetle, *Elater oculatus*; by C. L. Andrews. Large spider, from Dorchester, Mass.; by George H. Barry.

BOOKS RECEIVED DURING THE QUARTER ENDING JUNE 30, 1859.

Mémoires et Documents relatifs à l'Histoire du Canada. 8vo. Pamph. Montreal, 1859. *From Capt. Latour.*

Phycologia Australica. By Wm. H. Harvey. Nos. 4–8. 8vo. London. *From Dr. B. D. Greene.*

Report of the Geological Survey of the State of Iowa. By James Hall and J. D. Whitney. 2 vols. 8vo. *From the Authors.*

Reply to the Criticisms of J. D. Dana. By J. Marcou. 8vo. Pamph. Zurich, 1859. *From the Author.*

List of known species of Pisidium, with their Synonymes. By Temple Prime. 8vo. Pamph. 1859. *From the Author.*

Leçons Elementaires de Botanique. Par Emm. Le Maout. 8vo. Paris. *From Dr. S. Durkee.*

Catalogue of Canadian Plants. By Prof. J. Barnston, M. D. 8vo. Pamph. Montreal. *From the Author.*

Report of the Superintendent of the Coal Survey, for 1857. 4to. Washington. *From Prof. A. D. Bache.*

Contributions to the Paleontology of New York. By James Hall. 8vo. Pamph. Albany, 1858. *From the Author.*

Patent Office Report. Arts and Manufactures. 3 vols. 8vo. Washington, 1858. *From the Patent Office.*

Iron Manufacturer's Guide. By J. P. Lesley. 8vo. New York, 1859. *From the Author.*

Edinburgh New Philosophical Journal. Vol. IX. No. 1.

Geology of Pennsylvania. By Prof. Henry D. Rogers. 3 vols. 4to. With vol. of maps, &c. Edinburgh, 1858. *From Prof. Henry D. Rogers.*

On the Lower Coal Mines, as developed in British America. By J. W. Dawson, L.L.D., &c. 8vo. Pamph. Montreal, 1858.

Additional Notes on the Post-Pliocene Deposits of St. Lawrence Valley. By J. W. Dawson, L.L.D., &c. 8vo. Pamph. Montreal. *From the Author.*

Proceedings of the Elliott Society of Natural History of Charleston, S. C. Vol. 1. 8vo. 1859.

Proceedings of the Academy of Natural Sciences of Philadelphia. Sigs. 9 and 11. 1859.

Bulletin de la Société de Geographie. 4eme série. Tome XVI. 8vo. Paris, 1858.

Canadian Naturalist and Geologist. Vol. IV. No. 2. April. Montreal, 1859.

Canadian Journal of Industry, Science, and Art. No. 20. March. Toronto, 1859.

Monatsbericht der K. Preuss. Akademie der Wissenschaften zu Berlin. 8vo. 8 Nos. Sept. 1857, to June 1858.

Mathematische Abhandlungen der K. Akademie der Wissenschaften zu Berlin. 4to. Jahr. 1857. Berlin, 1858.

Physikalische Abhandlungen der K. Akademie zu Berlin. Jahr. 1857. 4to. 1858.

Transactions of the Cambridge Philosophical Society. Vol. X. Part VI. Cambridge, (England). 4to. 1858.

Ofversigt af Kongl. Vetenskaps-Akademiens Förhandlingar. 8vo. 1857. Stockholm.

Kongliga Svenska Vetenskaps-Akademien Handlingar. Bd. I. 2. 1856. 4to. 1.

Kongliga Svenska Fregatten Eugenies Resa Omkring Jorden under befäl af C. A. Virgin. 4to. 1. Botanik. 1, 2, 4. Stockholm.

Zeitschrift für die Gesammten Naturwissenschaften. Jahrgang, 1858. Elfter Band. 8vo. Berlin.

Notices of Proceedings of the Royal Institution of Great Britain. Part VIII. 8vo. Pamph. London, 1858.

List of Members, Officers, &c. 8vo. Pamph. London, 1858.

Journal of the Royal Dublin Society. Nos. 9–11. 8vo. 1858.

Journal of the Geological Society of Dublin. Vol. VIII. Part 1. 8vo. 1858.

New York Journal of Medicine. Vol. VI. No. 3. May, 1859.

Archiv für Naturgeschichte. Wiegmann and Erichson. 8vo. No. 2. 1858. Berlin.

Recueil des Actes de l'Académie Impériale. 2me Trimestre. 1858. 8vo. Pamph. Bordeaux.

Natural History Review. Vol. V. No. 4. Oct. 1858. London.

Proceedings of the Royal Geographical Society of London. Vol. II. No. 6. Oct. 1858.

Actes de la Société Linnéenne de Bordeaux. 8vo. 1858. 3me Série. Tome 1.

Jahrbücher des Vereins für Naturkunde. 8vo. Wiesbaden, 1857.

Verhandlungen der Russ. Kais. Mineralogischen Gesellschaft zu St. Petersburg. Jahrgang, 1857–8.
Silliman's American Journal of Science and Art. No. 81, for May, 1859. *Received in Exchange.*

Annals and Magazine of Natural History. Nos. 15, 16, and 17. London. 1859. *From the Courtis Fund.*

Encyclopædia Britannica. Vol. 17.
Life of Fred. Wm. Steuben. By F. Kapp. With introduction by Geo. Bancroft. 8vo. New York. 1859.
Memoir of Theophilus Parsons, Chief Justice of Supreme Judicial Court of Massachusetts. By his Son, Theophilus Parsons. 8vo. 1. 1859. *Deposited by the Republican Institution.*

July 6, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Mr. Stodder read the following paper :—

ON COLLECTING, PREPARING, AND MOUNTING DIATOMACEÆ FOR THE MICROSCOPE.

BY ARTHUR M. EDWARDS, NEW YORK.

Although most of the published treatises on the microscope profess to give thorough directions for mounting objects in such a manner as to preserve them for almost any length of time and exhibit their characteristics, very few of them present any concise descriptions of the best methods of collecting or mounting Diatomaceæ. In general they treat solely of the fossil, or semi-fossil, species, and even such directions as relate to these are meagre and unsatisfactory for the most part, and, where they amount to specific and special directions, are copied from other books, so that any faults that may have been in the original are repeated. To mount Diatomaceæ for the purpose of sale is one thing, and to prepare and mount them so as to exhibit the natural characters for the purpose of study is another. The latter can only be attained after considerable practice ; and to do it properly a certain knowledge of their natural history is necessary.

The Diatomaceæ should always be mounted for a special purpose; that of exhibiting characters peculiar to genera and species. Of course we must leave entirely out of the question all such objects as muds, guanos, dredgings, &c., which can very rarely, if ever, be used for the purpose of exhibiting species. Gatherings containing many species in a mixed condition should invariably be rejected, unless they contain something of special importance, such as rare species, or some large and fine specimens of common species. In this paper it is my intention to give such plain and concise directions as will, I hope, materially aid students in mounting these interesting organisms in such a way as to exhibit their characteristics in a proper manner. For many of the hints I am about to give I am indebted to Professor Walker-Arnott of Glasgow, Scotland; the rest are the results of the experience of about six years spent in this pursuit. For the method of cleaning guanos, infusorial earths, muds, &c., the reader is referred to a paper, by the present writer, published in the seventh volume of the London Journal of Microscopical Science.

All gatherings should be made in as clean a state as possible in the first place, as it will be found difficult to clean them afterward. The Diatomaceæ are to be found growing in both fresh and salt water, either attached to submerged aquatic plants of larger growth, or floating freely on the surface. It is a mistake, that most writers on this subject have fallen into, to term any of the Diatomaceæ parasitic, as they do not subsist on nutriment derived from the plant, or other substance, to which they are attached. The attached species might more properly be termed *epiphytaceous*, and the free ones *eleutheraceous;* many species, however, there is little doubt, are at one period of their existence fixed, and at another free. That there are any true free species is unestablished; that is to say, I very strongly suspect that all of our so-called free species are fixed during the earlier period of their growth. Some species are to be looked for on the surface of the muddy bottom, or in the stomachs of certain marine creatures, as the *Salpæ*, the *Noctiluca miliaris*, &c. A peculiar method of procuring these last is used, and will be described.

Diatomaceæ are to be looked for in almost every stationary piece of water, and, in some cases, in transient pools, the result of flooding or rain. Freshwater species will be found attached to, or entangled among, the leaves and stalks of larger submerged aquatic plants. The common Hornwort, *Ceratophylum demensum*, is often thickly incrusted with *Synedræ*, *Melosiræ*, &c., so that it is of a brownish color. Marine plants are also covered in the same manner; thus, I have had *Bryopis* completely covered with *Melosira Borreri* and *Cocconeis scutellum;* the first species being again the support for *Podosphenia* and *Synedra*. *Ectocarpus* is often so covered with *Synedra*, and the freshwater *Confervæ* have in general so many Diatoms growing attached to them, that I have in this way collected several *ounces* of *Synedra radians*. On rocks and sticks, more especially in running water, are to be found the filamentous and frondose species. In the month of April last, I found in the fountain in Washington Square, New York, in which the water had been kept running all through the winter, a large quantity of *Fragilaria capucina* associated with a few other species, and incrusting the iron tube of the fountain. The *Fragilaria*, from growing in rather violently running water, was extremely tenacious in the adherence of its frustules one to the other. Some freshwater species are to be found floating on the surface, but this is not as often the case as with the brackish. The plants bearing the Diatoms may be agitated in clear water and the species allowed to settle. The water used should be from the same locality as the Diatoms, or, if from any other, be carefully filtered through chemists' filtering paper. This precaution will prevent the introduction of any extraneous species which it would be impossible afterward to remove, and prove extremely puzzling, as I had experienced until I found out this method of obviating it. Writers in general recommend the use of distilled water, but the filtered article answers every purpose, and is procured by a much easier and expeditious process. The general appearance of Diatoms when floating, is of a reddish-fawn colored mass of a seeming porous nature, but when they are in small quantity they appear only as a stain on the water, and when attached to floating conferva the brown of the Diatoms is masked by the green of the conferva. A pond or stream may be known as likely to yield Diatoms, from its having growing in it much vegetation of a larger size. In general, quiet ponds, or such as have but slow streams running into and emptying out of them, will be more likely to reward the searcher than briskly running streams, in which the Diatoms are loosened from their hold and carried down to the valleys, or mouth of the stream. This is the reason why we often find mountain species associated with those growing in valleys, or, in some cases, even with brackish and marine species. Many of these freshwater species will undoubtedly exist for a short time in brackish or marine localities, often becoming much changed in their characters. It is extremely likely that this fact has sometimes led to mistakes by inexperienced observers, and the consequence has been the erection of these varieties into species. Again, brackish or marine species may be carried by tidal or other influences into fresh localities, and a total change of characters result. At the present time I am engaged in experimenting on this subject, and shall, I hope, be able before long to lay the results before microscopists. Professor Walker-Arnott has stated some curious facts, relating to this subject, in the April number of the London Microscopical Journal for this year (1859). It would, however, be out of place for me to enter any farther into the discussion of this subject in the present paper, but I recommend the student to bear these facts in mind when examining doubtful forms.

Brackish species are to be looked for in swamps and marshes along the coast. Whether there exist such things as true brackish species is, to me, a matter of doubt; such as are called so being, in my opinion, either marine forms which have been carried by the tide into their new locality, (which is the most likely,) or freshwater species brought down by streams from higher ground. Thus, I have found in a salt marsh in New Jersey a form which looks to me like a variety of *Pinnularia viridis*, a true freshwater species. In the same marsh, even in the least salt portions, I have found many fine species, as *Amphiprora vitrea*, *Pinnularia peregrina*, *Navicula elegans*, and many others, in large quantities, forming masses of considerable extent, and floating on the surface, buoyed up by the numerous bubbles of oxygen set free from the water by the action of the sun on the Diatoms. All of these are generally considered as marine species. Submerged species are to be found in brackish water in the same positions as in fresh.

In the ocean, very few species are to be found floating on the surface, except in rock pools, but are found in the stomachs of certain microphagists. The filamentous forms, on the contrary, are to be found in immense quantities along with the attached forms, as *Cocconeis*, &c., and this most commonly on rocky coasts, where often the algæ, rocks and coralline zoöphytes are covered with them. Dr. Wallich found *Coscinodisci*, *Rhizosoleniæ*, and *Chætoceras*, floating on the surface of the ocean in the tropics, but I have never heard of such an occurrence in our seas. The species attached to algæ may be preserved, until they are wanted to be permanently mounted, in alcohol; they are thus kept in their natural state. Species may be removed from the algæ by immersion and boiling in a weak mixture of nitric acid and water, (containing four to five per cent. of acid,) which corrodes the cuticle of the alga without breaking up the chains of Diatoms. The algæ may then be taken out with a glass rod, or strained off through a piece of wire gauze or fine muslin; if the latter be used, the filamentous Diatoms will often be retained along with the algæ, and such attached species as *Cocconeis* pass through. All marine, or brackish, species should be washed in filtered freshwater, so as to remove all soluble salts, which would otherwise obscure the specimens, previous to immersion in alcohol, or mounting. I should mention here, that often freshwater, unless it be distilled, will contain certain salts, as lime, which will, on evaporation, crystallize on the glass and mar the beauty of the specimen, therefore it is advisable to use distilled water, or alcohol, for the last washing. As a rule, it is always preferable to make the collection as clean as possible in the first place, as it will be found difficult in many cases to render the Diatoms perfectly free from sand and mud afterward. Where they float on the surface of the water, or are attached to larger algæ, this is not difficult, but where they are on the mud at the bottom it is not so easy. It can, however, be done by carefully removing them with a camel's-hair pencil, or, if we do not happen to have one with us, the mud can be removed in a wide-mouthed bottle (selecting as much of the surface as possible) and, at home, transferred to a saucer and placed in the sunlight. The living specimens will then congregate toward the lightest side, and may be taken up with a camel's-hair pencil and transferred to a test tube or specimen vial. The latter are the vials used to hold homœopathic medicines, and those of about a drachm capacity will be found the most convenient, though, for scarce gatherings, much smaller ones may be used with advantage. Dr. Donkin has given * a process by means of which Diatoms left by the receding tide on the sea-shore may be separated from the heavier particles, and which seems to have yielded him a rich harvest. The attached and filamentous species should always be kept separate from the free ones, in alcohol, as they have to be treated in a different manner. We must also suit the amount of boiling, and the strength of the acid, to the species; some being destroyed by the smallest quantity, and others being ruined by strong acid. Many species, however, (as most of the genus *Pinnularia*) require often a minute and a half to two minutes' boiling in strong acid to separate the valves from the connecting membrane.

Some of the finer marine species are to be looked for in the stomachs of Salpæ, Noctiluca, and other minute marine creatures, while the stomachs of most of the mollusks, and those of many crustaceans and fish, will repay examination. The Salpæ and Noctiluca are to be procured by skimming the surface of the ocean (more especially in quiet bays and harbors) with a fine muslin net, which may be floated by means of cork or wood, and dragged at the stern of a boat rowed slowly along. When the Noctilucæ are in any quantity, the surface of the ocean will exhibit a livid light playing upon its surface, especially where it is broken, as on the margin and where the prow of the boat parts it, or the oars disturb it. They are most plentiful in summer, but Diatoms are to be found in them all the year round. Col. Baddely found in them, during the winter, such genera as *Triceratium* and *Actinocyclus*, and during the summer months the filamentous forms, as *Rhizosolenia;* the same facts, or similar ones, will undoubtedly be observed on our own coast when more attention is paid to this branch of science. I would recommend all who have opportunities of doing so to collect the Noctiluca of any part of our coast and preserve them in alcohol for the Diatoms they contain. The Ascidiæ and Holothuriæ also yield rich harvests of Diatoms, and when they come from a distance, as from the Pacific Ocean, where they are plentiful, are extremely interesting. The contents of the stomachs of the Noctilucæ may be simply washed in distilled water and preserved in alcohol; those of Salpæ and Ascidiæ should be cleaned with nitric acid, but the

* Mic. Soc. Trans. Vol. VI. p. 12.

contents of the stomachs of Holothuriæ, mollusks, and fish, will have to undergo a peculiar process similar to that recommended for guano, though, in some cases, boiling in nitric acid alone will be found sufficient. I would here mention, that the process used in England for cleaning guano, of boiling in chlorohydric acid, carbonate of soda, and nitric acid successively, I have not found to succeed, and that described by me in the London Microscopical Journal is the only one that I have found to approach perfection.

For the purpose of collecting Diatoms, it will be found convenient to be supplied with appropriate apparatus. A tin sandwich-box is an excellent reservoir for the bottles. These may be of about the capacity of two ounces, which is the size I have found the most convenient, and the box should hold ten or a dozen of them. Sometimes it will be found convenient to be provided with a few small vials, of about a drachm capacity, for the purpose of holding portions of scarce gatherings. A walking-stick with a ferule attached, made to receive some contrivance for holding bottles, will often be found necessary. Such a one is described by the present writer in Vol. V. of the London Microscopical Journal. I have used a similar one for nearly five years, and it is in as good order as when first made. Smith * and Donkin † have given some hints on collecting Diatomaceæ which the reader will find useful. Certain species affect certain seasons, so that in the same locality, at different seasons, totally different species will be found. A complete knowledge of the seasons in which the different species flourish is much wanted, and the student will do well to pay attention to this branch of the science.

When the gatherings are taken home, they may be turned out into saucers and placed in the sun ; in this way the living Diatoms will be separated from the dead ones, the former floating on the surface and approaching the light. Many of the gatherings, no doubt, will be found useless, either from being mixed with mud and sand, or from the mixed quality of the species contained, and had better at once be rejected, as, unless they be wanted to illustrate locality, (an almost endless task,) it will be found extremely difficult to clean them in a proper way, so as to show satisfactorily the species they contain. Some collectors examine the gatherings on the ground by means of some such

* Synopsis. † Mic. Soc. Trans. Vol. VI. p. 12.

contrivance as the Gairdner microscope, described by Dr. Carpenter, or improved by Mr. J. N. Tomkins.* Dr. Arnott informs me that he uses two Coddington lenses, one of 66 diameters, and one of 180, generally using the former only. In this way we may at once tell what is worth retaining, and what should be rejected. Gatherings are, however, always examined with the compound microscope soon after we get them home; the movements of the Diatoms in their living state may then be observed, and the presence and position of the endochrome noted. To study the reproduction of these plants they must also be observed in the recent living state, as no method of mounting known will preserve, in their natural condition, the characteristics of this interesting and important part of their natural history.

If we wish to mount the Diatoms simply to show that they are Diatoms, and to surprise the uninitiated, nothing is easier; we have but to boil them for some time in nitric acid, wash them with water, and place a small quantity of the sediment on a glass slide, and dry it over a spirit lamp. When it is dry, and still hot, we drop upon it a small quantity of Canada balsam, and place over it the previously prepared thin glass cover and press it down. When the balsam is sufficiently hard, the superfluous portion which has exuded around the cover is removed with a penknife, and the slide is cleaned with alcohol; this latter being far superior to turpentine, which the European (and more especially English) microscopists use, on account of the high price of alcohol. The above process is extremely easy to manipulate, but it will never satisfy a student of the Diatoms; for, though it is sufficient for fossil and sub-peat deposits, it would never do for the purpose of illustrating genera and species, for which Diatoms should be prepared and mounted. We therefore proceed to show how they may be mounted so as to satisfy a student, and render permanent their characteristics, so that they may, at any future time, be exhibited and studied.

We shall require, in the first place, a quantity of glass slides, of the dimensions of one inch wide by three inches in length. These should be of as white glass as possible, and ground on the edges so as to give them a neat and finished appearance. Only such as are free from scratches, or other blemishes, in the central

* Mic. Jour. Vol. VII. p. 57.

square inch, should be chosen; though such as have bubbles or scratches near the ends will not look ornamental in a cabinet, we should remember that microscopic objects are not generally mounted to look well in a cabinet, but to be useful out of it, so that if the central and useful portion of the slide be perfect it need not be rejected. Thin glass, such as is made on purpose for microscopic use, will be next required, and it will be found more convenient to buy it ready cut into squares and circles than to attempt to cut it ourselves. If, however, we do have to cut it ourselves, we may follow the direction given in the books, which I will not repeat here, only adding one fact that I have not seen generally noted, which is to place the thin glass on a piece of *wet* thick glass, or marble, the water preventing its breaking, as it will be apt to do if this precaution be not taken. The thin glass may be of different thicknesses, but for the more delicate species it must be as thin as possible. It should be perfectly clean, which may be insured by removing the grease with potassa lye, and the resinous substances with turpentine, or alcohol, or both. The thinner kinds of glass are rather difficult to clean, but with a little extra caution this may be accomplished, the last polish being given to it by a piece of old and well worn cambric. It should then be separated into thicknesses and kept in starch powder, which prevents its being scratched, but all the starch must be carefully removed with a dry piece of cambric before the glass be used, otherwise granules of starch will be introduced which will prove puzzling when we come to examine the slide under the microscope.

We shall also require a pair of forceps for holding the slides over the spirit lamp, and such as are sold under the name of American clothes-pegs are extremely useful, and answer all the purposes of more complicated and expensive arrangements. A small pair of brass forceps which close with a spring will be needed for holding the thin glass, and an ordinary pair which spring open, and may be closed by means of the finger and thumb, will be wanted for removing the thin glass from the box in which it is kept. A spirit lamp holding about four fluid ounces and a few test tubes for boiling the deposits, together with a small quantity of nitric acid, alcohol, and turpentine, will be found necessary. For the purpose of making cells will be needed a Shadbolt's turn-table and some cements. Brunswick black and asphaltum, or gold size, are recommended by the European writers, and I have sometimes used a preparation of fine red sealing-wax dissolved in alcohol, or a mixture of asphaltum, pitch, and gutta percha, made by dissolving asphaltum in turpentine until it will take up no more; this is strained through fine muslin, and pitch added to the liquid, so as to make, when it is dissolved, a composition about as thick as Canada balsam. To this a few pieces of gutta percha are added, and it is allowed to stand in a covered vessel until it becomes thick enough for use, which may be known by its dropping only with some difficulty from the camel's-hair pencil used to place it on the slide. For mounting Diatoms in their recent state, so as to exhibit the stipes in the stipitate species and the endochrome in all of them, a mixture of equal parts of proof spirit and distilled water will be found useful. For some species I have found an excellent medium to be Mr. Farrant's compound of glycerine and gum Arabic,* it preserves the endochrome of the Diatoms and the plant on which they are found growing intact and of its natural appearance. For some species, however, it will not do, as it renders them so transparent that they are with difficulty visible.

I will now proceed to specify the different methods of mounting Diatoms separately; lettering them so that they may be referred to.

A. We wash the gathering in fresh water, which has been either distilled, or, at least, filtered, and separate the heavier from the lighter species. We shake the gathering violently in a large quantity of water, and almost immediately pour it off; this removes all sand and gravel. The Diatoms are allowed to settle, and the water is poured off after about an hour's standing. Enough fresh water is now poured over them to make a height of two inches in the glass, and it is allowed to stand for twenty, or at most thirty minutes. The water being carefully removed, it carries with it the mud and portions of broken valves. Even the smaller species will subside through two inches of water in thirty minutes, but, as Dr. Arnott remarks in a letter to the present writer, "such as *Odontidium parasiticum* and a few other minute things may require an hour, as they lurk among the mud,

* Lond. Mic. Jour. Vol. VI. p. 118.

being as light." We can now arrange according to densities, and in this way often separate most of the species contained in the gathering. Several processes of elutriation are mentioned in the London Microscopical Journal, but I have found that using always two inches of water, and separating the thirty minutes into five or six periods, answer all purposes. In this we shall get all the larger *Triceratia*, *Pinnulariæ*, &c., in the heavier densities, and the small *Achnanthidia* and *Naviculæ* in the lighter. Often one application will not separate the densities sufficiently, when it may be tried three or four times. If the gathering be not divided into densities before "acidizing," it will have to be done after; that is to say, if it be not a comparatively clean one, consisting of a majority of one species. The different densities are now each placed, in small quantities, in a test tube, and about three quarters of an inch of nitric acid added, and boiled. This will remove all but silica, and separate the valves and connecting membranes; but if we wish the valves to remain united, we must use weaker acid, as I have mentioned before. When the sediment has been well washed, so as to remove all the acid, we may proceed to mount it, which is done as follows. A small portion is taken up with a dipping tube, or a glass rod, (the first being the best,) and spread with a little water on the centre of a clean slide. Only a small quantity should be used, otherwise the Diatoms will be crowded and overlap each other. It is always better to have too few than too many specimens on a slide. We now heat the slide cautiously over the flame of the spirit lamp until it is perfectly dry, and while it is warm a small quantity of Canada balsam is dropped on it, and the heat is continued (but not so violently as to boil the balsam) until we consider it ready to receive the cover, and this point can only be ascertained after some experience. The cover, previously cleaned, is now placed on the balsam, one side being placed down first, so that a wave of semi-fluid balsam is driven before it; we thus prevent the introduction of bubbles, which would be extremely difficult to get rid of afterward. Balsam mounting is always to be preferred when it can be done so as to show the species, and when we have gone through the above steps we have finished the mounting part. The slide only requires to be put aside until the balsam is perfectly hard, which will sometimes not be for a week. The extraneous balsam around the cover is now removed with a pen-knife, or a brad-awl, and the slide cleaned with alcohol, and wiped dry.

B. Filamentous and stipitate species must be mounted by the above process to show the valves, and by another special one to show the genus. They are placed in alcohol, which removes the endochrome without breaking up the chains, and then a small portion is dried on a cover, and when it is cool a drop of turpentine added. This permeates the frustules, and prevents the entrance of air when the balsam is added. A small quantity of balsam, in a fluid state, is now dropped on it and heated very cautiously over the spirit lamp, whose wick has been pushed down until only a small blue cone of flame is visible. A drop of balsam is placed in the centre of a clean and warm slide, and, after that on the cover has been sufficiently thickened, they are united, pressed together, and allowed to cool, when they may be cleaned as above. This process preserves the filaments, and brings the specimen nearer to the object-glass than if it were dried on the slide.

C. Sometimes the treatment with alcohol does not remove all the endochrome, when it will have to be burned out over the lamp as follows: The Diatoms are spread on the cover and dried. The cover is still kept over the small blue flame, and we see the specimen turn of a light brown, then darker, until it is black, and finally white, when it is brought down smartly once or twice to the flame. This must not be done too suddenly, nor must the glass be removed too soon, or it will crack from the sudden change of temperature, and if the thin glass be kept too long over or against the flame, it will bend and be useless.

D. Diatoms which have been dried or burnt on the cover may be mounted dry by means of cells. These are best made of Brunswick black, or some other varnish, and they should be made in quantity and kept on hand. The method of making them is given in most of the handbooks. When the Diatoms have been dried on the cover, and the glass is still somewhat warm, it is placed upon the ring of varnish, with the Diatoms toward the slide, and pressed down. If it does not at once adhere, it is not advisable to heat it from below, but a warm knife may be laid on it, or a warm wire passed around on the thin glass until it adheres completely, and this it must do all around before we attempt to add the outer coat of varnish. I have often dispensed entirely with this extra coat, though, if the varnish be at all brittle, it will be necessary.

E. The process of mounting in fluid is very similar to the last described, except that the Diatoms are placed in the cell, and the fluid dropped on them until it rises slightly above the edge of the cell, to which it will adhere by capillary attraction. The cover has then a line of fluid drawn across it with a glass rod, and one side, on which the line terminates, placed down first. It is then allowed to fall slowly, driving a wave of fluid before it, as in the case of balsam mounting. The line of fluid attracts the mass of it, and no bubbles are allowed to enter. If any air should get into the cell, either from evaporation or carelessness, the cover will have to be removed, and the operation commenced over again. After the cover is placed on the ring, the exuded fluid is wiped off, and a ring of varnish placed over the edge of the glass. This part of the operation is explained in the handbooks, so I will not repeat it here. Mr. Farrant's medium, which I have mentioned above, does not require any cell, and in many cases no exterior ring of varnish, as it becomes almost solid, and retains the cover in its place. Many species will require all of these modes of mounting to show all of their characters, but some will require to be mounted only in balsam and in the dry way. Some species are ruined by balsam, while others are improved, therefore different modes should be tried, and that which seems to give the best results adopted.

Diatoms may be kept in quantity in alcohol, dried on mica (which is the best), or dried on mica after boiling in acid. These last are sometimes difficult to remove from the mica. Carbonate of soda and water, or even acid, will often have to be used. Diatoms kept on mica have the advantage of being always ready to be mounted by any of the above methods, and they may also be sent through the post, as they are not bulky, nor do they weigh anything considerable.

When the gatherings are small, they may be kept, after they are cleaned, in small bottles similar to those mentioned above, but when in any quantity, they will require to be kept in two or four ounce vials; and, so that we may remove any quantity for mounting, we use what are called "dip tubes," which are glass tubes drawn out at one end so as to form a small orifice. When the thumb is placed on the larger end, and the smaller brought down under the water until it is almost in contact with the deposit, and the thumb removed, the water will rush in, carrying with it some of the Diatoms. The thumb is then replaced and the tube withdrawn. In this way we can extract any quantity of the deposit we wish. A tube should be used for only one deposit, otherwise we shall be apt to have species from one gathering mixed with another totally different one. I generally have the cork to each of my specimen bottles with a hole in it, and a glass "dip tube" passed through it. Thus each bottle is provided with a tube, and if it pass tight enough through the cork, little or no evaporation of the contained liquid will result.

When removing water that has been used for washing a deposit, if we pour it off, and even if we use the guide rod, we shall be almost certain to disturb the deposit, and lose some of the lighter species, which will be decanted with the liquid. To obviate this difficulty, I tip the glass so that the deposit runs down on one side, and then I remove the supernatant water with a large pipette, using it very carefully as the water becomes lower. With a little practice nearly all the water may be removed, and the Diatoms left undisturbed.

Dr. Henry Bryant read the following paper:—

A LIST OF BIRDS SEEN AT THE BAHAMAS, FROM JAN. 20th TO MAY 14th, 1859, WITH DESCRIPTIONS OF NEW OR LITTLE KNOWN SPECIES: BY HENRY BRYANT, M. D.

The Bahama Islands are scattered over a space comprised between 20° 55′ and 27° 15′ North latitude, and 71° and 78° 18′ West longitude. They are of every shape and size, from Andros which contains more than a thousand square miles to the merest point of rock, and are numbered by hundreds if not by thousands. Of course in the short space of time occupied by my visit a thorough examination was impossible. The following observations were made principally at New Providence, in the neighborhood of Nassau, the seat of government; I also made excursions to the Berry Islands lying on the northwest side of the N. E. Providence channel, to the Biminis, the most westerly of the Bahamas, to the east side of Andros and neighboring keys, and to the Exuma and Ragged Island chain of keys, extending as far as 21° 17′ North and 75° 27′ West.

All the islands visited by me presented the same geological formation, a cellular limestone varying in its texture from a rock of extreme hardness to a soft and friable sandstone, and composed of materials thrown up by the action of the waves and winds, of every shape and size, from madrepores of six feet in diameter to the finest sand. In the larger keys the rocky surface is covered with a thin layer of vegetable soil capable of supporting in some places a thrifty vegetation. The majority of the smaller keys are entirely without soil, though when not exposed to the action of the waves they are covered with a thick growth of shrubs, which, in many cases, belong principally to the Cactus family, and are so thorny and tangled that they are almost impenetrable. I saw nowhere the luxuriant vegetation and profuse animal life that is naturally associated with the West Indies. Of native mammals I procured but a single specimen, a species of bat. I was told that at Andros there was a wild rabbit, but could not procure a specimen. The number of sea birds in certain localities is prodigious, but at Nassau I saw but one gull and one pelican. The species of land birds that breed upon the islands are few, though the individuals of some of them are quite numerous. In the class of reptiles, I found six species of lizards, four of serpents, no land or freshwater turtles, and four batrachians. The number and variety of fish are very great. Crustacea and radiata abound. Land mollusks are very numerous, but only fourteen species were seen. Insects, with the exception of lepidoptera and a few species of diptera, were by no means common.

Before visiting the Bahamas, I had supposed that those birds of the United States, which in their annual migration follow the Atlantic coast, crossed over to the Gulf of Mexico on arriving at the Peninsula of Florida, and then followed that shore to Mexico, Central America, &c. This opinion was formed from the fact that while all of these birds are extremely abundant in Southern Georgia, they are rarely seen in the neighborhood of Enterprise and Indian River. From the number of these birds seen at the

Bahamas, I am satisfied that with better opportunities nearly if not quite all of them would be found there, and that, instead of crossing to the Gulf of Mexico as I formerly supposed, by far the greater number on arriving at the River St. John or its neighborhood fly across in a direct line to Central America, stopping on their way to procure food and to rest at any of the islands which lie in their way.

Cathartes aura. Turkey buzzards were very abundant at Andros, and I was told by the fishermen and wreckers that they were equally so at Abaco and Grand Bahama. I saw none on any of the smaller islands. I was for a long while unable to explain satisfactorily to myself the cause of their absence from Nassau, as in the United States they are generally very abundant in the neighborhood of the large southern cities, as Charleston and Savannah for instance. This fact, I now think, is owing to their inability to procure food at New Providence. All the animals slaughtered there are literally devoured by the blacks; not a morsel, even of the entrails, is thrown away as offal, so that the slaughter-houses, which at Savannah are their principal feeding places, do not at Nassau offer them a mouthful of food. The number of domestic animals also running at large on the island is so small, that the carcasses of those dying by disease or accident would only afford them an occasional supply; and the native fauna is so meagre that it is unnecessary to take it into consideration.

I passed several days at Grassy Creek near the southern extremity of Andros Island. This is one of the places where the Black-mouthed Helmet (*Cassis Madagascariensis*), of which cameos are made, is procured. The shells after being brought on shore are placed on scaffolds with the mouth downward, in order that after the death of the animal it may fall out by its own weight. These scaffolds are constantly attended by the buzzards, and they can frequently be seen tugging at the protruding animal much to the displeasure of the fishermen, as the birds frequently knock down the shells and sometimes drag them into the bushes out of sight. The name given to this bird by the inhabitants is John Crow, the same as in Jamaica according to Gosse. I examined several specimens but could detect no difference between them and birds obtained in the United States. This is not to be wondered at, as the Gulf Stream is so narrow that I think when soaring at the greatest height to which they attain they must be able to see the main land, and if so, doubtlessly pass to and fro. No specimen of the *C. jota* was seen.

Falco anatum. One dead bird seen at Norman's Pond Key. This was an adult male in fine plumage.

Tinnunculus sparverius. Two specimens seen at Nassau, and one at Great Stirrup Key.

Accipiter fuscus. This appeared to be the most common hawk. A number were seen at different places. I was told by many of the inhabitants that a large red hawk was not uncommon in the South Keys, but I saw no other species than those mentioned above and the fish hawk.

Pandion Carolinensis. Fish hawks were found throughout the Bahamas, but nowhere so abundantly as in parts of the United States. The nests which I saw were placed in entirely different situations from those chosen by this bird with us; resembling more nearly in this respect the European species. They were all built on the ground; two that I examined at Water Key, Ragged Islands, were placed on the edge of a cliff at an elevation of about forty feet from the water, very bulky, at least five feet in height and six in diameter, composed entirely of materials taken from the neighboring beaches, principally the horny skeletons of Gorgonias, sponges, bits of drift wood, and sea-weeds. They had been recently repaired and the cavities lined with fresh gulf weed. On the 20th of April, the date of my last visit to them, they contained neither eggs nor young. The eggs in the ovary of a female, shot at this time, were of the size of small peas. The plumage of this specimen differed from any I ever saw in the United States; the whole upper part of the head, nape, and hind neck was white without any admixture of brown; no difference was observed in the comparative measurements. I intended to have preserved it, but unfortunately before I was ready to skin it the cook plucked it for his private table.

Crotophaga lævirostris? A species of Crotophaga was quite abundant in the environs of Nassau. The description of the habits of the *C. ani* by Gosse, is applicable in every particular to the present bird. I procured a number of specimens; in all of hem the bills were quite smooth. The present bird is certainly not the *C. ani*, and as it may be an undescribed species I append a description of it:—Sexes similar,—general appearance like the other species of the genus. Plumage above, wings and tail dark black with purplish reflection, and in some lights greenish. The tail very obscurely banded, as if watered. Below, dull brownish black; the borders of the feathers of all the upper parts, wing coverts, throat, and upper part of head iridescent. Bill blackish horn color, the edge and tip of culmen light horn color. Tarsi and feet black. Length,* .315; wing from flexure, .143; tail, .184; tarsus, .032; middle toe, .034, its claw, .012; hind toe, .013, its claw, .0105; bill along ridge, .034; gape, .028; height of bill, .020; breadth of bill, .008; nostrils, diagonal, .004 in length by .002 in breadth; the superior edge nearly straight, and the inferior concave; situated .01 from the culmen and .004 from the lower edge of mandible; 4th quill longest; 3d equal to the 5th; 2d, .012 shorter than 4th; 1st, .035 shorter than 4th, and shorter than any other of the primaries.

Saurothera vetula. Quite abundant, called Rain-Crow. Its food during the winter consisted principally of a species of Phasma, found in great abundance in the leaves of the air-plants. This bird is one of the tamest, considering its size, that I am acquainted with. I have frequently watched them searching for insects within two or three feet of my head.

Picus villosus. Two specimens seen at Nassau in the month of February.

Picus varius. Two specimens seen during February, and a number during the spring months. They seemed to prefer the cocoa-nut trees. I did not see them on any other tree. The first pair seen visited the same clump of cocoa-nut trees every day for a fortnight.

Trochilus Bahamensis. This species of humming-bird, which I believe to be undescribed, is the only one found at Nassau and neighboring islands. It is quite abundant there and a constant resident. All the specimens I procured, seven in number, were killed in February and the early part of March; at that time its

* All the measurements given are in parts of a metre, and the height and breadth of bill, when not otherwise mentioned, are always taken opposite the centre of the nostrils.

food consisted almost entirely of a small green aphis, found abundantly on the West Indian vervain, (*V. stachytarpheta,*) a small blue flower that grows in all the dry pastures. Gosse calls the least humming-bird of Jamaica the Vervain Humming-Bird, from its hovering round this plant, but the name would apply equally as well to the present species. I saw nothing in its habits differing from those of the common ruby-throated species, with the exception that it was more quarrelsome in its disposition, chasing the "fighter," as the *Tyrannus caudifasciatus* is called, whenever it came near him, and that its note is louder and shriller than that of our species and much more frequently uttered. Incubation commences by the 1st of March. I saw three nests of this bird; one, found on the 3d of March, contained two eggs partly hatched; a second, April 10th, one egg, and another, in May, two eggs. The nests were all composed of the same materials, principally the cotton from the silk cotton tree, with a few downy masses that looked as if derived from some species of asclepias; this was felted and matted together, and the outside stuck over with bits of lichen and little dry stalks, or fibres of vegetable matter. One now before me measures .030 in diameter, and .033 in height externally, and the inside .018 in depth and .025 in diameter. The eggs, like those of all others of the family, are two in number, snow-white when blown and slightly rosy before, and measure .012 in length by .008 in breadth.

Description. Adult male — above, green with metallic reflections, slightly golden on the back, and with the tips of some of the feathers in some specimens bluish. The head darker and more sombre. Wings brownish purple, with dull greenish reflections in some lights. Tail dark purple, almost black, also with greenish reflections; the outer feather on each side with an almost obsolete terminal spot of rufous, the next with the whole of the inner web bright cinnamon, the next with the whole of the inner and the basal half of the outer web of the same color, this color then running nearly to the tip in a diagonal manner, leaving the part next the shaft purple. The basal half of all the shafts, except the two outer, cinnamon. Throat magnificent purple violet, immediately below this a broad gorget of white; abdomen green mixed with rufous; thighs white; crissum pale rufous white; bill and tarsi black; length, .084; to end of claws, .060; to end of wings, .086;

extent, .123; wing from flexure, .045; tail beyond wings, .005; tail, .028; difference in length of tail feathers, .005; tarsus, .0035; middle toe, .0033, its nail, .003; bill along ridge, .016; gape, .019; height of bill at commencement of feathers, .0013; breadth, .0023. Adult female — Upper parts less lustrous than in the male, the feathers margined more or less with rufous gray; wings as in male; tail with the middle feather brilliant green, the rest cinnamon with a purplish black band running from the outer feather obliquely downward and inward to the tips of the fourth on each side, forming a broadly shaped mark; between the black band and the cinnamon there is a spot of bright green, most conspicuous in the feather next the central ones and growing gradually indistinct toward the outer ones; throat pale rufous white, the centre of the feathers darkest, and on the sides and posteriorly a little green; abdomen entirely rufous; legs and crissum, pale rufous. The dimensions do not differ from those of the male. Young male in winter — Upper parts intermediate in brightness between the male and female; throat white, with a few feathers beginning to show the violet; tail as in male.

I have not been able to find descriptions of all the modern genera of this family, but I think it would form a new genus. All the males procured by me, four in number, had but eight tail feathers, while all the females, three in number, had ten. It can hardly be supposed that in four specimens, the same two feathers, and but two, should have been lost from every specimen. In form, the tail feathers are rather narrow, and the inner webs of the two outer slightly falciform or emarginated. The two outer feathers are slightly shorter than the next which are the longest; the next two again rather shorter, and the central ones considerably (.005) shorter. The feathers composing the tail in the female are broader than those of the male; the third from the outside is the longest; the 1st, 2d, and central one as in the male; and the 4th slightly shorter than the 3d.

Chordeiles popetue. Very abundant during the summer months, but migrate farther south in autumn. They began to arrive about the first of May, and were numerous by the 10th.

Ceryle alcyon. Abundant during the winter. I saw none after the 1st of April.

Tyrannus caudifasciatus. Called "fighter" by the inhabitants, from its pugnacious disposition. It is a constant resident and did not seem more abundant in spring than in winter. In its habits and appearance when flying, or perched on some twig, it resembles very much the *T. dominicensis*, for which I mistook it until I had procured a specimen. Both these birds are much more powerful and active than the *T. intrepidus*, and in the present minute subdivision of genera, should be separated from the genus *Tyrannus*. Its flight is both powerful and rapid, and it frequently swoops from its perch like a hawk on some object on the ground. I took from the stomach of one an *Anolis* six inches in length.

Empidonax Bahamensis. This bird I believe to be new, at least I have been unable to identify it by any description, and it is not contained in any of the collections that I have had access to. It comes nearer, perhaps, to *E. Carribæa* than to any other species I have seen. It is, however, possible that it may have been described; the descriptions of this genus are generally so meagre, while the mutual resemblance of many of them is so great, that it is almost impossible to identify the species positively. I saw only three specimens, all in the month of March. There was nothing peculiar in its habits, which resembled those of others of the genus that I had seen in the United States.

Description. Adult male — Plumage above, dark cinereous brownish olive, the olive tint most marked on the rump, and the head darkest, with each feather showing a darker stripe in the centre; lores ashy white; an incomplete white circle round the eye, broadest behind and deficient above; wings brownish, with the edges of the coverts hoary, forming two transverse bands, the posterior the most marked; edges and tips of the secondaries and tertiaries whitish, most conspicuously so toward the body. Tail brown, with the edges of the feathers slightly olivaceous, and of the outer feather toward the base hoary; throat and abdomen pale yellowish white; sides of the head and flanks cinereous, gradually shaded into the lighter color of the throat and abdomen; breast pale yellowish white washed with cinereous, except perhaps in the centre. Tarsi black; bill with the upper mandible, black; lower, light horn color, with the tip darker; length, .145; to end of claws, .129; to end of wings, .190; extent, .253; wing from flexure, .085; tail beyond wings, .035; tail, .060; tarsus, .014; middle toe, .009, its claw, .0053; hind toe, .006, its claw, .0065;

outer toe, .006, its claw, .0037 ; inner toe, .005, its claw, .004 ; bill along ridge, .014 ; gape, .02 ; depth of bill, .0035 ; breadth, .007 ; length of nostril, .0015 ; breadth, .0012 ; 3d quill longest ; 4th very little shorter ; 2d, .0015 shorter ; 5th, .004 shorter, and 1st, .01 shorter than the 3d. The first is nearly equal to the 6th.

Mniotilta varia. Common from April 20th, to May 10th.

Trichas Marylandica. While lying at anchor, on the 20th of April, in the harbor of Grassy Creek, a flock of these birds commenced flying by the vessel, and continued without intermission for two hours ; they did not fly in a compact body, but were constantly passing during this time, more or less being in sight the whole period. Many of them alighted on the vessel ; all of them that I saw were males. On the 10th of May, they were still abundant in the neighborhood of Nassau.

Sylvicola coronata. A few individuals of this species were to be seen in the neighborhood of Nassau during the months of January and February ; by the middle of March they had entirely disappeared. I saw none on any of the smaller islands.

Sylvicola Blackburniæ. One pair seen on April 30th.

Sylvicola striata. Very abundant from the 1st to the 10th of May. In its habits this bird approximates very nearly to the *M. varia*, climbing round the trunks of trees in search of insects, apparently with the same facility as the latter bird.

Sylvicola maculosa. As abundant as in the United States. A few were seen as early as the 15th of March.

Sylvicola icterocephala. Only a few seen in the early part of May.

Sylvicola Canadensis. The males of this pretty and conspicuous species were very abundant near Nassau, from the 20th of April to the 13th of May. I think that in this short period I saw more than I had ever seen before.

Sylvicola maritima. One female shot May 6th.

Sylvicola discolor. More abundant than I have ever met with it in the United States. In January all the males were in winter plumage, and they had not changed entirely to the summer plumage before the 1st of April. I have no doubt that this bird is a constant resident of the Bahamas, and breeds there ; it had paired by the middle of April, and after that date I saw none that were not mated.

Sylvicola palmarum. During the winter and early spring this bird was extremely abundant, but confined almost entirely to the neighborhood of the sea-shore. Its habits are decidedly terrestrial, and it approaches in this respect very nearly to the titlarks. They were constantly running along the edge of the road, or else hopping among the low shrubs in the pastures. I did not see a single individual seeking for food amidst the large trees. My room at Nassau was opposite the market, where these birds could be constantly seen running up and down the pavement in search of the small flies so numerous there. These they caught either on the ground or else by hopping up a few inches, scarcely opening the wings, and alighting directly. Why this bird has been so fortunate as to escape being made a new genus of, I do not know.

Setophaga ruticilla. Very common from the 18th of April to the 13th of May. First seen at Andros Island.

Tanagra zena. Abundant at New Providence. Resident and breeds there. Its food consists almost entirely of small berries; the stomachs of nine individuals examined at different times from Jan. 20th to March 13th, contained no other food. Incubation had not commenced by May 13th, at least not generally.

Hirundo cyaneoviridis. This swallow, which I have been unable to find described, is one of the most beautiful species inhabiting North America. In the style of its coloring it resembles more nearly *H. thalassina* than any other species. I have no doubt that it has been confounded by European naturalists with the *H. bicolor*, though its resemblance to this species is very slight. I saw them during the whole of my stay at Nassau, but only on the first mile of the road leading to the west end of the island. They were so abundant there that thirty or forty could be seen at almost all times. Its flight was more like that of the *H. horreorum* than the *H. bicolor*. They generally followed the road up and down, seldom flying high but skimming along near the ground. I did not succeed in finding their nests, and could not ascertain whether it bred on the island or not. I killed no specimen after the 28th of April; up to this date the genital organs exhibited no appearance of excitement. The stomachs of those dissected contained almost entirely small dipterous insects, some of them extremely minute.

Description. Adult male — Bill rather long; tail deeply forked, but with the outer feather not attenuated; tarsi and feet rather robust. Head, neck, and back, of a beautiful velvety green with a slight shade of olive, almost precisely the same as the green of the *H. thalassina*; a black band from nostril to the eye. Upper tail coverts, wing coverts, and secondaries, bright steel blue, the primaries and tail feathers more or less greenish, and the feathers of the latter very narrowly margined externally and more widely internally, except toward the tips, with whitish. Below snowy white. Bill black; tarsi and feet dark horn color. Length, .155; to end of claws, .122; to end of wings, .189; extent, .292; wing from flexure, .112; tail beyond wings, .012; length of tail, .069; difference in tail feathers, .028; tarsus, .009; middle toe, .01, its claw, .0052; hind toe, .005, its claw, .005; outer toe, .008, its claw, .0037; inner toe, .007, its claw, .0037; bill along ridge, .0062; gape, .015; depth of bill, .0022; breadth, .0055; length of nostril, .001; breadth, .0007. Adult female — Plumage much less brightly colored than in the male; the green on the forehead dusky, and the tertiaries narrowly margined with whitish. The white of the lower parts less pure; a little dusky on the breast and fore neck, and cinereous on the flanks.

Lanivireo crassirostris. This species of Vireo is, I think, undescribed. It is not a common bird; three specimens were all I obtained. When first seen I mistook it for the white-eyed Vireo. I noticed nothing remarkable in its habits. All the specimens procured were actively engaged in hunting insects in small trees in the midst of a clearing about three miles from the city, on the road leading to the south side of the island. The first specimen was procured in March; the other two, a pair, in May.

Description. Adult male — Above bright yellowish olive washed with gray; upper tail coverts rather more greenish than the rest; a spot of bright sulphur yellow from nostril to the eye, narrowly encircling the latter. Wings brownish, with the outer margins of the primaries and some of the secondaries greenish olive; two very distinct pale yellowish white bands across the wings, formed by the tips of the coverts; the posterior continuous with a longitudinal band of the same color formed by the edges of the secondaries next the body. Tail brown, with the margins of the feathers olive green. Below pale sulphur yellow, with the flanks and sides of neck shaded with dusky, the latter color slightly washed across the breast. Tarsi, dark horn color. Bill : upper mandible, dark horn color; lower, pale horn color. Length, .126 ; to end of claws, .134 ; to end of wings, .136 ; extent, .185 ; wing from flexure, .058 ; tail beyond wings, .032 ; length of tail, .047 ; tarsus, .0175 ; middle toe, .0115, its claw, .006 ; hind toe, .008, its claw, .007 ; outer toe, .009, its claw, .0052 ; inner toe, .007, its claw, .0055 ; bill along ridge, .012 ; gape, .017 ; depth of bill, .0045 ; breadth, .005 ; nostril, .002 in length, by .0007 in breadth. Spurious quill a little more than half the length of the second ; 4th and 5th equal and longest ; 6th nearly equal to the 3d, and .0015 shorter than the 4th ; 2d .007 shorter, and 1st .026 shorter than 4th ; 2d equal to 9th ; 7 transverse scales on the anterior part of tarsus. Adult female resembles the male in proportions, but the colors are so faded and the feathers so much worn that the upper parts are grayish, with hardly any olive tint. The white border of the secondaries almost invisible except on the inner feather ; the bands formed by the tips of the coverts are white ; the yellow spot in front and around the eyes still conspicuous, though pale,—the lower parts much paler. A second male, shot in March, is probably a young bird, as the plumage is intermediate between the adult male and female.

Vireosylvia altiloqua. Very abundant, arriving about the 1st of May. The note of this bird did not appear to me to resemble the syllables Whip Tom Kelly more than any other, though this phrase might be introduced as part of the note, pronouncing the first syllable very distinctly, and terminating with an additional note longer than any, thus, — Whīp tōm kĕllȳ pheŭū, and frequently still another long note, wheŭū. The note varies, however, though this is the most common one. I procured seven specimens, all males. I think the female had not arrived by the 13th of May. As this is a rare bird in the United States, I give below measurements of the largest and smallest of the seven.

	♂	♂
Length	.171	.158
Length to end of claws	.169	.152
Length to end of wings . . .	.198	.185
Extent	.250	.215

	♂	♂
Wing from flexure	.082	.076
Tail, beyond wings	.030	.030
Tail	.060	.058
Tarsus	.0172	.0155
Middle toe	.012	.011
Middle toe claw	.0065	.006
Hind toe	.0075	.0075
Hind toe claw	.0085	.0075
Outer toe	.0105	.009
Outer toe claw	.005	.0047
Inner toe	.008	.0075
Inner toe claw	.0055	.0055
Bill, along ridge	.016	.017
Gape	.021	.021
Depth of bill	.0042	.0042
Breadth of bill	.0045	.0045
Length of nostril	.002	.002
Breadth of nostril	.001	.001
Difference of tail-feathers	.001	.001

Mimus rubripes. This bird did not seem to me to be very abundant. I met with only three specimens, all of them in the neighborhood of Nassau. It does not belong properly in the genus *Mimus*, though placed there by modern systematists. It is called by the inhabitants Blue Jay and Blue Thrasher.

Mimus Bahamensis. Although I have ventured to name this bird, I am not sure that it will not prove to be identical with *M. Gundlachii* of Cabanis; not, however, from its resemblance to his description, but from the locality whence that was procured,—one of the small kays on the north side of Cuba,—rendering it highly probable that it had flown there from some of the neighboring Bahama islands. This bird is equal, if not superior, as a songster, to our common species. It is the most universally distributed, though not the most abundant bird that I met with. On those kays which are barely large enough for any land birds to inhabit them, this bird is sure to be the first settler; and on some of them, as the Ship Channel kays, for instance, which are only a few acres in extent, there would be two or three pairs, each occupying its own domain, which it did not allow to be invaded by the others without giving battle at once. It was singular as well as pleasing to see and hear, on one of these lonely and almost desert kays, this graceful bird mounted on the topmost spray of some dwarf shrub, singing with as much fervor and satisfaction as if surrounded by listeners, instead of having for sole auditor his faithful mate. The pairs seem to keep together after the period of incubation has passed, as all I met with as early as February were mated, and the inhabitants stated they did not lay before May, and the sexual organs of all those dissected by me showed no appearance of excitement. In its habits it differs very much from our common species, delighting as much in solitude as the latter does in the society of mankind. Its food during my visit consisted almost entirely of the fruit of the prickly-pear, with the addition of an occasional insect. I presume that the insectivorous part of its diet is proportionally greater when it inhabits the larger islands; but on the barren kays on which I procured my specimens, insects are almost unknown, at least if I am to judge from the number seen by myself. The stomachs of all those procured by me contained a quantity of the seeds of the prickly pear, and a few remains of insects, and the feathers near the bill of all of them were stained red by the juice of the fruit. Near Nassau I saw but two individuals. *Description.* Male: form and general appearance more robust than that of the *M. polyglottus.* Plumage above cinereous rufous brown. The rufous tint most marked on the rump and upper tail coverts; all the feathers striped down the centre with dark brown, the stripes largest on the back, and best defined on the head, and nearly or quite obsolete on the rump; a superciliary stripe of the same from the nostrils gradually vanishing towards the hind head. Cheeks white, with the tips of the feathers blackish-brown,—ear coverts whitish, with the tips and margin of the same color as back. Wings dark brown, with the edges of the outer webs of the quill feathers whitish ash; greater and middle wing coverts tipped with whitish, forming two bands across the wing; a dark linear spot of blackish brown runs down the centre of each of the middle coverts, and projects into the white of the tip,—this is also faintly indicated in the greater coverts. Tail cinereous brown; all the feathers edged with a lighter shade as if faded. The tips of the four outer feathers white,—this color extending about twice as far on the inner as on the outer webs; the 5th narrowly tipped with the same color, and the two central feathers entirely cinereous brown. Throat slightly rufous white, a few of the feathers tipped with blackish brown, forming on each side a pretty distinct beard stripe; breast pale cinereous, with a very small spot of a darker shade near the tips of most of the feathers; abdomen white; flanks drab, very distinctly striped with blackish brown down the centre of each feather; crissum same as flanks, with the streaks not so distinct. The feathers that cover the shoulders when the wings are closed have a decided rufous tint; legs dark horn color; bill black; 1st quill a little more than half of the length of the second; 5th the longest; 4th, half a millimetre shorter; 6th, 2 shorter; 3d, 1½; 2d, 12; and 1st, 46 shorter than the 5th; 2d shorter than the 7th, and longer than the 8th. The female does not differ from the male in the color of the plumage,—one specimen is brighter than any of the males I procured. Dimensions:—

	♂	♀
Length	290	282
Length to end of claws	260	255
Length to end of wing	282	273
Extent	380	375
Wing from flexure	120	120
Tail, beyond wing	90	95
Tail	134	131
Tarsus	36	37
Middle toe	25	25
Middle toe claw	9½	9
Hind toe	13	12
Hind toe claw	12	12
Outer toe	18	18
Outer toe claw	6½	7
Inner toe	15	15
Inner toe claw	7	8
Bill, along ridge	23	22
Gape	29	30
Height of bill	6½	7
Breadth of bill	7	6½
Length of nostril	2	2

	♂	♀
Breadth of nostril	$1\frac{1}{2}$	$1\frac{1}{2}$
Difference of tail-feathers . .	22	23

Cabanis distinguishes *M. Gundlachii* from *M. saturninus*, with which he compares it, first, by its having the spots on the flank fainter,—in the present bird they are, if anything, more distinct; secondly, by the tips of the tail-feathers being much more narrowly marked with white, diminishing gradually toward the centre,—in the present bird the first four feathers are almost equally marked with white, the 5th very slightly so, and the 6th not at all. In one specimen the white is actually broader on the 4th than on the 1st feather.

Certhiola flaveola. One of the most abundant birds, and found on most of the kays, the mocking-bird only being more generally met with. It had not commenced laying by the middle of April. Judging from the quantity of empty nests seen, it must have the same habit as many of the wrens, of making more nests than it can occupy. The nests were pensile, formed of the fibres apparently of the cocoa or some other palm. The entrance is at the side, near the top. All those seen were on small bushes not higher than the head from the ground. On my arrival at Nassau, the leaf of life (*Verea crenata*) was in full bloom, and these birds seemed to derive their whole sustenance from the insects found in its flowers. These it did not procure by inserting its bill into the flower, but by thrusting it through the petals. After these flowers had disappeared, I saw them in large numbers about the sour oranges, devouring the juice and pulp of the fruit, and also the small insects attracted there. The common name of this bird is Banana bird. Though a well-known bird, still, as it has been but recently added to the fauna of the United States, I think a description of the recent specimen might be desirable, and accordingly subjoin it.

Male: plumage above fuliginous; rump bright chrome yellow; a broad superciliary white stripe from the nostril ending abruptly at the hind head. Wings and tail the same color as the back;—the former with the base of the primaries white, forming a large bar of this color on the wings, and the edges of all the quills whitish; the latter with a white spot at the tips of all but the middle feathers, gradually growing smaller toward the centre of the tail. Below white, scarcely soiled with ashy on the throat, and more decidedly so on the flanks. The white ascends on the side of the neck on each side just above the shoulder, forming a widely interrupted collar. In the female the colors are less vivid. Dimensions:—

	♂	♀
Length	130	122
Length to end of claws	144	126
Length to end of wings	150	140
Extent	208	198
Wing from flexure	65	65
Tail, beyond wing	22	18
Tail	45	44
Tarsus	16	16
Middle toe	11½	11
Middle toe claw	6½	5½
Hind toe	7	7
Hind toe claw	7¾	6½
Outer toe	8	8
Outer toe claw	5	4
Inner toe	7½	7
Inner toe claw	5½	4½
Bill, along ridge	15	13
Gape	15½	14
Depth of bill	3½	3½
Breadth of bill	4	4
Length of nostril	1½	1½
Breadth of nostril	¾	¾
Difference in tail-feathers	4	4

4th quill longest; 2d and 3d scarcely shorter and nearly equal; the 1st 4 millimetres shorter, and equal to the 6th; the 2d, 3d, 4th, and 5th sinuated on the outer webs. Tail slightly rounded. Tarsi with 5 scutella in front. Tongue divided for half its length, and terminated by a pencil of hairy filaments; œsophagus 3 in length, 2 in breadth; proventriculus 8 by 2½; gizzard 7×5½×3 in its principal diameter; intestine 155 in length, the duodenum not plainly marked, but apparently about 40 in length; 2 small cæca $\frac{3}{4}$ in length, of an oblong form. Pancreas, with only one lobe. Liver, large; the right lobe $14 \times 5\frac{1}{2} \times 3$ in its principal diameter; the left lobe, $10 \times 6 \times 3$. Contents of the stomach, small insects, and in one case, the skin of a small larva, about three quarters of an inch in length.

Spermophila bicolor. This is the little Bahama sparrow of Catesby. It takes the place, at Nassau, of the *F. socialis* with us, and is equally unsuspicious and domestic in its habits. In the town, they were much more numerous than in the environs. I do not remember seeing any at a distance from the road. It is called Parroquet by the inhabitants.

Spermophila violacea. This bird certainly does not belong in the same genus as the *bicolor.* It is placed by Bonaparte in the genus *Pyrrhulauda,* which I have, however, been unable to find described, and have therefore left it as placed by Gray. This sparrow is quite showy, and abounds in the environs of Nassau; its principal food, at the time of my visit, was the chicken-pea; these it shells with ease. It is called Spanish Parroquet by the inhabitants.

Dolichonyx orizyvora. On the evening of the 6th of May toward sunset, I saw a number of flocks of birds flying to the westward, and counted nine in all. This was on Friday. The next day the country was filled with Rice Birds, as they are called there, and boys and men, in large numbers, turned out to shoot them. I examined a quantity of them, all of which were males in full plumage. Numerous flocks still continued to arrive during this day and Sunday. On Monday, among those shot were many females. On Tuesday, only a few were to be seen, and on Wednesday they had entirely disappeared.

Agelaius phœniceus. A friend brought me a young male of this species on the 1st of March, one of three seen by him.

Columba leucocephala. This bird is a constant resident, though not frequently seen in the winter, at which time it is much less gregarious in its habits than in spring and summer. The number is probably augmented during and after the breeding season by birds that have passed the winter farther south. It breeds in communities, in some places, as at Grassy Kays, Andros Island, in vast numbers; here the nests were made on the tops of the prickly-pear, which cover the whole kay. At the Biminis and Buenavista Kay, Ragged Island, on the mangroves; and at Long Rock, near Exuma, on the stunted bushes. I do not think they ever select a large kay for their breeding place. The eggs are laid by the middle of May, and the young leave the nest about the 1st of July; previous to which, great numbers are killed by the negroes. It is a shy bird when not breeding, even in the most uninhabited localities. Its food consists entirely of berries and fruits. It is called simply Pigeon.

Zenaida amabilis. The Zenaida Dove, though more seldom seen than the former species, is still by no means rare. It never collects in flocks, not breeding in communities, like the *C. leucocephala.* In its habits it is intermediate between the *Z. Carolinensis* and the *C. passerina.* It feeds and passes the principal part of its time on the ground, and when flushed, flies off in a straight line, very much as the common quail. The crops of those killed by me were filled with small seeds, about the size of a mustard seed, apparently all of the same kind. All the nests I saw were made in holes in the rocks, and consisted, as is always the case in this family, of but a few sticks. I do not know whether it migrates farther south during the winter or not; it was certainly much more abundant in May than at any previous time.

Chamæpelia passerina. Abundant everywhere, even on the smaller kays. It is, next to the banana bird, the most universally distributed.

Ortyx Virginianus. Common at Nassau, where it has been introduced from the United States, within the memory of individuals now living. It resembles, in every respect, the southern specimen of this bird from the United States.

Ardea egretta. A few seen.

Ardea candidissima. More abundant than the *A. egretta.*

Ardea herodias. Abundant.

Ardea cœrulea. The most common species of heron. From the rocky nature of the kays, and the general absence of marsh grounds, I had been led to suppose that birds of this family would be rare; but this was by no means the case.

Ardea virescens. Abundant; building in the same manner as in the United States. Eggs laid by the 1st of May.

Nycticorax violaceus. Very abundant everywhere. Nests made by April 20th; eggs laid by May 1st. In some places there were a number of nests in the same locality; generally, however, not more than two or three; still more frequently a single one.

Platalea ajaja. A few seen at the Biminis; said to breed there by the inhabitants, but I did not succeed in finding any nests.

Phœnicopterus ruber. The Bahamas are a favorite resort of these birds. I saw immense numbers of them at different places. One of my objects in going to the Bahamas, was to be able to visit their breeding-places; but, unfortunately, the state of my health rendered this impossible, as I was unable to make the necessary exertion. In the "Naturalist in Bermuda," I saw it stated, that this bird does not sit on the nest with its legs hanging down on each side. All the persons that I asked about this, and they were quite a number, including the Hon. Judge Lees, a most intelligent man, gave the same account of the nidification of this bird; namely, that the nest is built of clay or marl, and that it is raised gradually, the bird waiting for one layer to dry before applying another; and when completed it forms a cone, very much in the shape of a sugar-loaf, slightly excavated on the top, and that the bird sits on it with its legs hanging down on each side. The breeding-places are in shallow lagoons, generally at a distance from the shore, and as the bottom is a tenacious clay, they can only be approached with great exertion. I heard of three breeding-places,—one at the Bight of Bahama, a second at Andros Island, and the third at Inagua.

Ægialites vociferus. Very abundant during the winter.

Ægialites semipalmatus. Common till May.

Ægialites melodus. Resident through the year; abundant.

Ægialites Wilsonius. Resident through the year; abundant.

Squatarola Helvetica. Rather common. I saw none in spring. Several that I shot were in the plumage of the young bird.

Hæmatopus palliatus. Abundant wherever there were sandy or gravelly beaches; resident and breeds there.

Strepsilas interpres. One large flock seen April 26th, at Green Kay, near Andros, all in full spring plumage.

Himantopus nigricollis. A few seen near the Salt Pond.

Gallinago Wilsoni. Tolerably abundant in suitable localities.

Tringa Wilsoni. Abundant around the Salt Pond as late as the 25th of April.

Tringa semipalmata. Abundant around the Salt Pond as late as the 25th of April.

Symphemia semipalmata. Abundant; resident; breeding in all suitable localities. Called Duck-snipe by the inhabitants.

Rallus crepitans. I saw a few specimens, but as I did not visit those places where they would be most likely to be found, did not see as many as I otherwise should. I frequently heard another species of rail, but did not see it; having no dog, I was unable to flush it.

Fulica Americana. Abundant, and resident the whole year.

Gallinula galeata. " " "

Gallinula Martinica. I think that this bird must be common, but I met with but one specimen.

Dendrocygna arborea. Common, and breeds on the southern island. At Nassau it was common, but did not breed there.

Anas boschas. Common during the winter.

Nettion Carolinensis. " "

Querquedula discors. " "

Fulix marila. " "

Fulix collaris. " "

Aythya Americana. " "

Erismatura rubida. " "

The four last species are seen in immense flocks, sometimes acres in extent. The Red-head seemed to be the most abundant.

Pelecanus fuscus. At the Biminis the Brown Pelican was numerous, and breeding on the mangroves, in the same manner as in Florida. On the 20th of February, the young were hatched in some of the nests, and incubation was advanced in all of them. I did not meet with the bird anywhere else. The development of the air-cells is greater in this bird than in any other that I am acquainted with. On touching it while alive, a distinct crepitus is felt and heard, as if it were emphysematous; all the bones, with the exception of the phalanges of the toes, contain air. It possesses much more intelligence than I gave it credit for. A tame one, belonging to the Colonel of Engineers at Nassau, was in the habit of going every morning to the fish-market. Fish are always sold alive, and, in order that the purchaser may select them, are taken out of the water and spread before him; this was the moment for the Pelican, and, if he had been as active as he was voracious, he would have fared well; but, unfortunately for him, the fishermen were generally too quick, and, seizing him by his long beak, would throw him into the water, where he would remain for some time, looking with great solemnity at his persecutors, and then return to try his luck again. As I was passing by his owner's house one day, he commenced tugging at my trousers with his bill; at first I did not understand what he wanted, but noticing that the gate was shut, thought it possible that he might wish it opened; this I accordingly did, and he walked in at once, without stopping to thank me. This bird was in immature plumage, probably not more than a year old.

Sula fiber. In a former article, I stated that I thought Audubon was mistaken in saying that this bird breeds at the Tortugas. I am now positive that he was so. The time at which they lay their eggs, and the manner of constructing, or rather not constructing, their nests, is entirely at variance with his account; in which, as I before stated, he has mistaken the nests of the Brown Pelican for those of the Booby. The Boobies, as well as the Dusky Petrels, always seek their food on the blue water; at least I never saw one on the bank; and, as the distance across the gulf is so short, they probably feed nearly as much on the Florida as on the Bahama side; and it is almost impossible that, agreeing as they do in their manner of breeding wherever I saw them at the Bahamas, they should so change their habits at the Tortugas. The eggs are laid, in most cases, by the 1st of February; the bird makes no nest, not even an excavation in the soil. The eggs are deposited indifferently on the sand, grass, or bare rock. My first visit to one of their breeding-places was made on the 10th of April, at St. Domingo Kay, which lies thirty-three miles south of Great Ragged Island, and is at the very extremity of the southern point of the bank, entirely out of the range of vessels of any kind, and is probably never visited, except occasionally by people from Ragged Island, who go there to collect the eggs of the Noddy. The kay is about three or four acres in extent, so low that in storms it is entirely washed by the waves. It can only be approached at one spot, and that only in calm weather. At the time of my visit, it was literally covered with Boobies, mostly young ones; of these, by far the greater part were fully fledged, and could fly with ease, but were still dependent on the parent birds for food. They kept by themselves, and were perched upon the rocks all around the edge of the kay. The younger birds were sprinkled all over the kay, wherever there was room for them, and of all ages, from those almost able to fly, to young ones but that moment hatched. I found the eggs of some twenty pairs, most of them on the point of hatching. The number in every case was two, though only one is usually attributed to them. In appearance they resemble those of the family generally, being greenish, covered with a chalky substance. In size they vary considerably, as also in form, the most elongated one measured .067 in length, by .038 in breadth; and the broadest, .055 by .040; the others varying between these two extremes, but averaging more nearly like the latter. The young, when first hatched, are entirely naked, and of a livid blue color; they soon become covered with a white down, then the quills and tail-feathers make their appearance, of a cinereous-brownish color, then the feathers of the body, neck, and head; and lastly, of the throat. On our landing, some of the old birds flew off, but by far the greater number remained, and did not trouble themselves to get out of our way, but on being approached too nearly darted at us with their powerful bills in a most savage manner. They seemed to be very quarrelsome in their disposition, continually striking at each other, not at all in an amicable manner, but as if they intended to do all the mischief in their power. How the different birds recognized their young was a mystery to me, as they apparently did not remain in the same place after they had attained any size. Besides St. Domingo Kay, I visited a number of other breeding-places, all of which resembled the one described, except in being more elevated above the water. The Booby is, I think, the most expert diver that I am acquainted with; no matter in what position it may be, whether flying in a straight line, sailing in a circle, just rising from the water, or swimming on the surface, the instant it sees its prey it plunges after it. I have frequently seen one dive from the wing, rise to the surface, and dive in rapid succession five or six times; and on taking flight again dive before it had risen more than two or three feet from the surface, and perhaps catch a dozen fish in the space of a minute. There is nothing graceful in its style; it is apparently work, and not pleasure. On one of the kays I visited, called Booby Kay, near Green Kay, I saw a great number of a species of *Anolis*, of a dark, almost black color, entirely unlike any seen elsewhere, but they were so timid, and active in their movements, that I could not procure a specimen. The stomach contained a great many varieties of fish; among them a cottus, a parrot-fish, flatfish of two species, and some large prawns; but their principal food seemed to be flying-fish, and a species of *hemirhamphus*.

Dissection. Heart large. Right lobe of liver, as usual, the largest; .085 in length, by .040 in breath. Left lobe .052 in length, by .025 in breadth. Gall-bladder elongated, and rather large. Pancreas lying between the two folds of the duodenum. Stomach enormous, occupying nearly the whole left side of the abdomen, extending from the heart to the cloaca, measuring, when entirely empty, .10 in length, by .06 in breadth. Intestines very large, 1.5 in length; cæca very small. The difference between the digestive organs of this bird and the fish-hawk is very marked, and is a good example of the various ways that nature takes to effect the same purpose; the food of both birds being the same. The intestine of the fish-hawk, which is the smaller bird, measuring 2.8 in length, nearly twice that of the booby, while its diameter is not more than one half as great.

Sula dactylatra, Lesson? Lesson's description of this bird is not sufficiently full to enable me to decide, with certainty, whether it is the same as those I procured at the Bahamas. If it should prove to be a new species, the name *elegans* would be appropriate, as it is the prettiest of the genus. In dimensions, it is about the size of the *Sula fusca*, but heavier and more muscular. I found them breeding but at one place,—St. Domingo Kay,—and there only some twenty pairs. They apparently lay their eggs later than the booby, as the largest of the young were not more than half grown, and the eggs of several were freshly laid. As in the booby, the number of the eggs was two. They were whiter than those of the latter bird, the chalky covering being much thicker, and did not differ as much in size or proportions; the two extremes measuring .066 by .045 and .062 by .044. They did not associate with the other species. The young birds and eggs were all in one part of the island. When half fledged they are very pretty, the snowy-white down with which they are covered forming a striking contrast with the dark brown of the tail and wings then just appearing. Their habits are precisely the same as those of the boobies, and their internal structure presents no appreciable difference.

Description. Sexes similar. Form more robust than that of the *S. fiber*. Secondaries and tertiaries rich brown, the primaries of the same color, but darker; some of the coverts of the primaries brownish; tail with the feathers below, brown, above hoary, the two middle feathers the most so, and the base of all white or whitish. All the rest of the plumage snowy white. Bill horn color, with the serrations of the upper mandible very distinctly marked. Iris pale yellow; naked skin around the bill, eyes, and throat, black. Tarsi and feet, yellowish-green. Measurements: —

	♀
Length	.796
" to end of claws	.768
" " wings	1.185
Extent	1.6
Wing from flexure	.435
Tail, beyond wings	.028
Length of tail	.165
Difference of tail-feathers	.075
Tarsus	.044
Middle toe	.074
" " nail	.019
Hind toe	.027
" " nail	.008
Outer toe	.08
" " nail	.01
Inner toe	.053
" " nail	.01
Bill, along ridge	.108
Gape	.128
* Depth of bill	0.33
* Breadth	0.25

Tachypetes aquilus. I found a few Man-of-war birds breeding at the Biminis; their nests were placed upon the mangroves, amidst those of the brown pelican and Florida cormorant. As these birds are much disturbed by the inhabitants, their breeding-places will probably be given up in a few years. On the central

* At the deepest part of the bill, there are no visible nostrils.

and highest part of Booby Kay, a colony of about two hundred pairs was breeding. The nests here were on the bare rock, and closely grouped together; the whole not occupying a space more than forty feet square. There were no boobies amongst them, though thousands were breeding on the kay. The largest breeding-place visited by me is situated on Seal Island, one of the Ragged Island Kays, and is five or six acres in extent. The nests, thickly crowded together, were placed on the tops of the prickly-pear, which covered the ground with an almost impenetrable thicket. On the 8th of April, the young were hatched in half of the nests, the largest about one third grown; the other nests contained eggs more or less hatched; out of many hundreds, I only procured seven that were freshly laid. I have visited the breeding-places of many sea-birds before, and some well worth the trouble, but none so interesting to me as this. It was a most singular spectacle; thousands and thousands of these great and ordinarily wild birds covered the whole surface of the prickly-pears as they sat on their nests, or darkened the air as they hovered over them, so tame that they would hardly move on being touched; indeed, the specimens that I procured were all taken alive, with my own hands. When I had penetrated as far among them as possible, I fired my gun; the whole colony rose at once, and the noise made by their long and powerful wings striking against each other was almost deafening. In a moment they commenced settling upon their nests, and were soon as quiet as before. Incubation is carried on by both male and female. The old ones feed the young at first by regurgitation. The food consists of the same species of fish as the booby's, and is principally derived from that bird, which they rob as the bald eagle does the fish-hawk. Why the booby should submit to this, being much more powerful, and armed with a most formidable bill, is strange. I have watched these birds for hours, while flying, and every now and then hovering over the surface of the water, but never saw them catch a fish. The popular idea at the Bahamas is, that the fish are stupefied by the excrement of this bird. If there is any foundation for this idea, I presume it is that the fish are attracted by it; though the abundance of fish is such, that one would think it hardly worth while to attract them in any way. The young are at first nearly naked, then covered with white down, and by the time they are the size of a pigeon have the bronzed-black scapulars so developed that they look, whilst sitting on their nest, erect on their tarsi, as if they had on cloaks. They were not quarrelsome in their disposition, like the boobies; frequently one would alight on a neighboring nest, without being disturbed by the owner. The single egg, which is white, is large for the size of the body, pretty uniform in shape; those picked out of some hundreds, as extremes, measured, the first, $69\frac{1}{2} \times 50$; the second, $66 \times 44\frac{1}{2}$; the third, $61\frac{1}{2} \times 45$. The intestine of this bird is proportionally still shorter than that of the booby, measuring only .850 in length. The stomach .80 in length; the division into the proventriculus only marked by the belt of glands, and the diameter of it, as well as of the œsophagus, apparently the same as the stomach. The liver is much smaller than in the booby, the right lobe measuring .036 by .032, and the left .04 by .025. Pancreas not observed; spleen small. Two small globular cæca .09 from anus.

Graculus Floridanus. At the Biminis cormorants were very abundant; nesting on the mangroves, as in Florida. On the 20th of February, in some of the nests the young were nearly fledged, whilst in others the eggs had not been laid. None were seen at any of the other kays.

Phäeton flavirostris? The description of the habits of this bird given in "The Naturalist in Bermuda" is so accurate, as to render a detailed description superfluous. I visited three breeding-places. At Long Rock, near Exuma, they breed in holes in the horizontal surface of the rock, as also at Water Kay, one of the Ragged Island Kays; at Kay Verde, which is situated about thirty miles east of Great Ragged Island, in holes in the perpendicular face of the cliffs, and also in the horizontal surface of the rock. Before depositing their eggs, the male and female occupy the same hole, but afterwards only one bird is found in a hole. Both sexes incubate. On the 20th of April, about half of the birds had not commenced laying, and a few of the eggs had been sat on for three or four days; most of them, however, were freshly laid. They feed from near daylight to about nine o'clock, when they return to their holes, in which they pass the hotter part of the day, again leaving them toward sunset in search of food. They cannot, of course, breed in communities like the tern, as suitable holes are not very abundant. At Water Kay, where they were more abundant than at any other place, in an extent of two miles only eleven birds were found. The holes chosen for their abodes are seldom shallow, and are often so winding that, though their harsh note can be heard, they can only be procured by demolishing the rock. In their habits, except that of diving, which I am ignorant whether they practise or not, they closely resemble the terns, as they also do in their mode of flight and external appearance; and with that family they should be associated.

On their breeding-places being approached, when they are out of their holes, they hover over the intruder, screaming and darting at him in precisely the same manner that the terns do. The long tail-feathers are never separated when flying, and the French name "paille en queue" is very expressive. I procured a single specimen with a pale straw-colored bill; it was a male, the plumage nearly pure white, much more so than in any of the orange-billed birds, and the fifth primary had the black narrowly edged externally with white, the whole length. I am not prepared to say that this bird, which agrees, with the exceptions above mentioned, with the other, is a different species, and if so, which of them is the *flavirostris* of Brandt. The orange-billed specimens were both male and female, and there was no external peculiarity by which the sex could be determined. The figure in Gray's "Genera" of this bird is very good. My specimen agrees generally with Mr. Geo. N. Lawrence's description, in the 9th volume of the Pacific Railroad Report. They are precisely alike in their markings, varying only in the shade of salmon, which is always deepest on the long tail-feathers and next on the back and hind neck. The tarsus and hind toe are not yellow, but flesh-colored, and this color extends obliquely across the foot from the basal extremity of the outer toe to the end of the 1st phalanx of the inner toe. There is no black that I can discover at the base of the 6th primary, though its shaft, as well as those of all the others, is black except toward the tip. The white tips of the five outer primaries diminish in extent from the 1st to the 3d, and then again increase to the 5th. The single egg is large for the size of the bird, whitish, covered almost entirely with reddish chocolate colored spots finely dotted over the surface, which can be easily rubbed off. The small number that I procured were of nearly the same form and dimensions. One of them measured .053 in length by .042 in breadth; in shape very similar to a common hen's egg. The eggs were sometimes deposited upon the bare rock and sometimes on a few twigs, which had however the appearance of having accidentally fallen into the hole. Measurements: —

	♂*	♂	♀	♀
Length . . .	.830	.785	.740	.790
Length to end of claws	.350	.367	.350	.345
Length to end of wings	.632	.620	.622	.633
Extent . . .	.945	.930	.925	.960
Wing from flexure .	.290	.280	.274	.290
Tail beyond wings .	.410	.400	.335	.380
Length of tail . .	.528	.495	.450	.495
Difference of tail-feathers	.476	.435	.400	.430
Tarsus . . .	.019	.022	.022	.020
Middle toe . .	.036	.034	.033	.032
Middle toe nail . .	.011	.010	.009	.010
Hind toe . . .	.014	.012	.013	.012
Hind toe nail . .	.007	.005	.005	.006
Outer toe . . .	.035	.032	.032	.032
Outer toe nail . .	.008	.007	.008	.009
Inner toe . . .	.029	.027	.027	.026
Inner toe nail . .	.010	.008	.008	.009
Bill along ridge . .	.055	.051	.051	.052
Gape . . .	.077	.074	.067	.072
Depth of bill . .	.018	.018	.016	.017
Breadth of bill . .	.009	.008	.008	.007
Length of nostrils .	.005	.005	.005	.005
Breadth of nostrils . .	.0012	.0012	.0012	.0012

Dissection. Neck very muscular. The sternum and ribs, which are very strong, cover the greater part of the abdomen. The ribs extend backwards .03 from the posterior edge of the sternum. There are seven sternal ribs, the 7th arising from the 6th; they are united with the seven posterior dorsal. There

* This specimen is the one with the light yellow bill.

are nine dorsal ribs, the anterior very short, only .016 in length; the second nearly as long as the third. The crest of the sternum projects very much anteriorly, and its height is four fifths of its length. The external border of the base is concave, somewhat in shape like that of the woodpeckers. The furcula is strongly united to the crest of the sternum, and in consequence of the great projection of the part is nearly perpendicular in its direction. The great pectoral is very much developed, arising as usual from all the crest of the sternum not occupied by the middle pectoral,—from the posterior edge of the base, leaving a large irregularly quadrilateral surface, which does not give origin to any muscular fibres,—from the anterior and external surface of the furcula, and from a bow-shaped space of the interfurcular aponeurosis .005 in height at the centre. The middle pectoral arises by a triangular-shaped head from the space comprised by a line drawn from the superior edge of the furcula to the posterior end of the union of the crest with the base, and from this last point to the linea aspera of the coracoid,—from all the interfurcular aponeurosis above the bow-shaped space giving origin to the great pectoral,—and from the inferior and inner posterior two thirds of the coracoid. Œsophagus large, .130 in length by .020 in diameter; proventriculus, .040 in length by .020 in diameter; glands very much developed; stomach, .035 by .022, walls quite thin. The contents of the stomachs of all the specimens procured, were partially digested flying-fish and the remains of a species of squid or cuttle-fish.* The right lobe of the liver, .055 in length by .025 in breadth and .015 in thickness. Left lobe, .050 by .020 by .015. In another specimen the liver was broader and shorter, the left lobe measuring only .039 in length by .029 in breadth and .015 in thickness. Gall bladder, .015 in length. Pancreas small, situated in the fold of the duodenum opposite the entrance of the ductus choledocus, .025 in length by .005 in breadth and 003. in thickness. Intestine small, .710 in length; cæca, .005 long by .004 in diameter; cloaca globular and quite large.

Thalassidroma Wilsonii. This bird, whose breeding-place has thus far escaped the researches of naturalists, I presumed would

* I had supposed these to be the mandible of some small species of fish like the parrot-fish, but they have been determined by Mr. Putnam to be those of the squid or cuttle-fish.

be found breeding at the Bahamas; but although I looked for it carefully, and inquired about it of all persons likely to have any information on the subject, I could not ascertain that it was ever seen on the kays, though occasionally one or two would follow a vessel into soundings. On my return, in the Gulf Stream, I first saw this bird about sixty miles north of Abaco, and by the next day they had become very numerous. I caught about twenty by allowing a thread to fly astern in a way well known to sailors. I saw no other species of stormy petrel.

Puffinus obscurus. On making inquiries as to what sea-birds breed on the kays, I was constantly told of a singular bird with a hooked bill that only flew during the night, and was known by the name of Pimlico; it proved to be the present species. It is very abundant, being found on all the uninhabited kays, near the channel, which are not too frequently visited by wreckers or fishermen. They breed in holes in the rock, as described in the "Naturalist in Bermuda." Near Nassau, at the Ship Channel kays, where I first met with them, incubation had already commenced by the 24th of March; the nest, consisting of a few dry twigs, is always placed in a hole or under a projecting portion of the rock, seldom more than a foot from the surface, and never, as far as my experience goes, out of reach of the hand; on being caught they make no noise and do not resist at all, unlike the tropic-bird, which fights manfully, biting and screaming with all its might. The egg does not seem to me to resemble an ordinary hen's egg; the shell is much more fragile and more highly polished. I broke a number of them in endeavoring to remove the bird from the nest. They vary a good deal both in size and form, some of them being quite rounded and others elongated; three of them measured as follows: one .059 by .036, another .052 by .033, and the third .051 by .037; both sexes incubate. Why these birds and the stormy petrels never enter or leave their holes in the daytime, is one of the mysteries of nature; both of them feeding and flying all day, are yet never seen in the vicinity of their breeding-places before dark. When anchored in the night time near one of the kays on which they breed, their mournful note can be heard at all hours of the night; during the day they may be seen feeding in large flocks, generally out of sight of land. They do not fly round much, but remain most of the time quiet upon the surface of the water. I did not see one on the banks, and never saw them dive or apparently catching any fish, though they are often in company with boobies and different species of terns, all of which are actively employed in fishing. About half way from Andros to the Bank I saw on the 26th of April a flock of boobies, sooty terns, noddies, Cabot's tern, and the dusky petrel, that covered the surface of the water or hovered over it for an extent of at least a square mile. Their number must have been enormous.

Description of recent specimens. All the upper parts, wings, and tail, sooty brown; below, white; the boundaries of the colors not abruptly marked; bill bluish, with the tips of the mandibles black; this latter color running up the culmen to the forehead. Tarsi and feet pale flesh-color, with the posterior edge of the tarsus, the whole sole, and the upper and outer surface of the outer toe, running obliquely backward at the tarsal extremity to the hind part of the tarsus, black. Dimensions: —

	♂	♀
Length	.344	.340
Length to end of claws	.350	.345
Length to end of wings	.497	.480
Extent	.690	.666
Wing from flexure	.217	.205
Tail beyond wings	.003	.001
Length of tail	.095	.088
Difference of tail-feathers	.02	.02
Tarsus	.037	.036
Middle toe	.041	.038
Middle toe nail	.0085	.009
Hind toe*	.000	.000
Hind toe nail	.003	.003
Outer toe	.042	.041
Outer toe nail	.006	.006
Inner toe	.033	.032
Inner toe nail	.007	.0062
Bill along ridge	.035	.036
Gape	.0445	.044

* No portion of the hind toe is visible externally but the claw.

		♂	♀
*Depth of bill	. . . . .	.0077	.007
*Breadth of bill	. . . .	.006	.0055
Length of nostril	. . . .	.003	.002
Breadth of nostril	. . . .	.0017	.0015

Dissection. Tongue triangular, fleshy, with fleshy barbs on the sides. Œsophagus, .395 in length by .036 in breadth when opened and spread out; proventriculus very large; it is folded on itself at an acute angle at the posterior extremity, and measures .075 in length by .045 in breadth. The gizzard is small, measuring .015 by .011 and .008 in its three principal diameters. The epidermis is thick and horny. The stomachs of all those examined, nine in number, contained a pultaceous mass highly nacreous, as if composed of the scales of a small fish, and the mandibles of a squid or cuttle-fish of much smaller size than those found in the stomach of the tropic-bird. Pancreas large, forming two or three distinct lobes. Spleen small. Liver with the right lobe measuring .04 by .02 by .009, and the left .029 by .012 by .008. On the anterior extremity of the external border of the right lobe is a prolongation in the shape of a leg of mutton, by which the renal veins enter its substance. Intestine very small, .590 in length, with two small globular cæca, .022 from the anus.

Larus atricilla. Abundant, resident, and breeding.

Sterna regia. The lower surface of the foot is orange, bordered with black; the edge not distinctly defined.

Sterna acuflavida.

Sterna fuliginosa.

Sterna Wilsoni.

Anoüs stolidus. All these species of terns are abundant, and breed on most of the unfrequented kays. The *S. fuliginosa* and *A. stolidus* in immense numbers, as at the Tortugas.

The Secretary read extracts from a letter from Mr. H. M. Lyman, of Royalton, Vt., to Dr. C. F. Winslow, in relation to the recent volcanic eruption in the Sandwich Islands.

* The depth and height of bill are taken immediately in front of the nostril.

Mr. Lyman estimated the original fountain crater to be at an elevation of about 9,000 feet above the sea. It would appear that the original outbreak was from the whole length of a fissure opening on the side of the mountain from the summit to the base, the first jet (January 23) being from the upper end of the fissure. As the force of the eruption subsided, the upper end of the fissure appears to have become clogged, so that the lava flowed only from the lower end and margin; in this way he accounts for the formation of successive cones, or active craters, one below the other, on the side of the mountain. During the first three weeks, the lava flowed in an open channel down the mountain till it reached the plateau at the base; but after this the fountain jet ceased to play with its primitive activity, the crater became clogged, the lava stream cooled on the surface for about half a mile from the original source, and at that point of emergence another cone was formed by the lava as it bubbled up from the end of the pyroduct that had been formed over the upper end of the flow.

The same process was repeated, the second orifice becoming partially obstructed, and a covered archway forming itself over the stream for a short distance below; by the middle of March a covered pyroduct had been formed over almost the whole of the lava stream. The lava does not appear to have flowed into the sea after the first week in February, but was dispersed by a network of innumerable streams traversing at random the great central plateau of the island. The amount of lava ejected has scarcely diminished from the first, though the fountain only plays at occasional intervals. The whole course of the eruption is like those of previous years.

Dr. C. T. Jackson read a letter from Mr. J. H. Blake, from Brandon, Vt., giving some further details about the frozen well, and containing a full thermometric table for that town at all seasons, from 1853 to the present time.

He also read a letter from Prof. J. Brocklesby with reference to the frozen well at Owego, N. Y., and other cold wells at different places.

Dr. White presented, in the name of Dr. Durkee, the upper portion of a human ulna, incrusted with a stalactitious deposit of carbonate of lime, from a cave in California.

The specimen contained the usual amount of animal matter of old and dried bones. The entrance to the cave was accidentally discovered, and was unknown to any of the present inhabitants of the vicinity; it was narrow, about thirty feet deep, opening into the cave, from the top of which the stalactites reached to the floor, multiplying indefinitely into the darkness, and so numerous as to prevent advance. The floor sloped considerably, and the bones were found upon it among the stalactites in great quantities and in the utmost confusion, glued together in all possible ways, and very much scattered. The specimen was brought home by a gentleman who obtained it with others from the cave. The locality of the cave was not stated, neither was it known whether the bones of animals were found with the human remains.

Mr. Ordway placed upon the table severa bottles containing the crustaceans collected by Dr. Bryant in the Bahamas; there were more than thirty species, in excellent condition, perfect in all their parts, and with the localities identified. Many were new to the cabinet, and probably some were undescribed species.

Dr. C. T. Jackson exhibited specimens of a compact specular iron ore from Phillipsburg, N. J.

The specimens resembled that found on Lake Superior; it makes most excellent wire. The ore rests on the ends of deeply inclined strata of hornblendic gneiss; over it is limestone, and over this a second bed of ore,—the first of eight, the latter of ten feet thickness. Over the ore beds is a layer of white serpentine, and the gneiss is cut by veins of red feldspar containing iron ore. It is a limestone region, and the iron is of a superior quality.

Mr. E. Samuels presented a box containing twenty-four slides for the microscope, of specimens of diatoms from the intestines of *echini* from the Sandwich Islands, Port Jackson, New South Wales, Tortugas, and Florida, prepared and mounted by himself.

The variety of diatoms thus obtained is very great, opening a vast field for the student in this department of Natural History; Mr. Samuels thought that fossil echinoderms in this way would yield many interesting fossil forms. The contents of the intestines thus far have been composed of about one half *foraminifera*, the residue of diatoms, spicules and gemmules of sponges, fragments of *algæ*, and sand.

Mr. E. S. Wheeler, of Berlin, Mass., presented the nest, four eggs, and the male and female bird of Henslow's bunting (*Ammodromus Henslowi*, Aud.), obtained in that town. The birds are not common, but are occasionally heard about meadows, which they frequent; their number has increased within a few years. The thanks of the Society were voted for this valuable donation.

The Corresponding Secretary read the following letters which he had recently received, viz:—

From the Yorkshire Philosophical Society, May 3, 1859, and the Geological Society, Dublin, May 31, 1859, acknowledging the receipt of the publications of the Society; Geological Survey of India, presenting its Memoirs and asking an exchange; and from Charles M. Tuttle, June 3, and F. V. Hayden, June 8, accepting membership.

Messrs. Cornelius Cowing and Frank P. Nash, of Boston, were chosen Resident Members.

July 20, 1859.

The President in the Chair.

The President gave an account of his recent voyage to the Rio de la Plata and the Uruguay, of his crossing the Pampas and the Andes to Valparaiso, and of his return on the Pacific to Panama.

Dr. A. A. Gould presented the following :—

DESCRIPTIONS OF NEW SPECIES OF SHELLS BROUGHT HOME BY THE NORTH PACIFIC EXPLORING EXPEDITION.

PAXILLUS TANTILLUS. T. minuta, cornea, pupæformis, inornata; anfr. 6 ventricosis. Apertura circularis, labio semicirculari, incrassato, ventre callo expanso copioso induto; canali antico obliquo curto. Axis 1.25; diam. .75 millim. Inhabits Hong-Kong. W. S.

PAXILLUS LYRATUS. T. parva, pupæformis, gibbosa, flavido-virens, apice lævi, alibi laminis erectis longitudinalibus lyrata; anfr. 7 ventricosis, penultimo ampliore; suturâ profundâ. Apertura subcircularis, anticè acuta, ventre callo copioso firmato; labro duplici, lateraliter viso flexuoso. Axis 3 mil.; diam. 1.5 millim. Inhabits Loo Choo Islands. W. S.

LITTORINA VIDUA. T. parva, ovato-conica, intensè olivacea et omnino flavido concinnè tessellata, striis transversis insculpta; anfr. 5 ventricosis declivibus. Apertura pyriformis, columellâ incarnatâ; labro intus lineato. Axis 7 millim.; diam. 4 millim.

Inhabits Ousima. Very regular in form, and the reticulations are only seen on close inspection.

BULLA VERNICOSA. T. ovato-globosa, solida, lævigata, latè perforata, cinereo cum rufo variegata et fasciis 4 macularum fuscarum interdum angulatarum cincta. Apertura angusta, labro recto vix inflecto rufo marginato; fauce porcellana. Axis 1.3 poll.; diam. .8 poll. Inhabits Loo Choo Islands. W. S.

Very shining, less inflated and narrower aperture than *B. ampulla;* more globose and more polished than *B. australis.*

ATYS MUSCARIA. T. minuta, ovato-elliptica, tenuis, virescens, punctis fuscis transversim dispositis ornata, striis utrinque insculpta; vertice infundibuliformi imperforato. Apertura angusta, anticè effusa; labro retrorsum producto, dentigero; columellâ brevi, tortâ. Axis 4 millim.; diam. 2 millim.

Inhabits China Seas. W. S.

ATYS PORCELLANA. T. parva, tenuis, ovato-cylindracea, lactea, striis transversis remotis utroque crescentibus arata; apice vorticiformi imperforato. Apertura angusta antrorsum amplians, basi subtruncato; columellâ profundè arcuatâ callo valdè munitâ subperforatâ. Axis 12; diam. 5 millim.

Inhabits Kagosima Bay. W. S.

HAMINEA ANGUSTA. T. parva, tenuis, ovato-cylindracea antrorsum ampliata, obtusè rotundata, flavo-virens, striis transversis insculpta; vertice obliquè truncato subperforato. Apertura antrorsum ampliata; columellâ haud excavatâ, plicâ et callo carente. Axis 6; diam. 4 millim. Inhabits Simoda. W. S.

Resembles in size and form *H. ambigua.*

PHILINE VITREA. T. modica, fragilis, vitrea, pellucida, iridescens, rotundato-ovata, depressa, undulis concentricis sinuatis notata; apice opaco vix indentato anfractum unicum exhibente. Apertura amplissima; labro posticè rotundato; columellâ acutâ absque plicâ interiorem testæ patefaciente. Axis 10; diam. 8; alt. 3 millim. Dredged at Hong Kong. W. S.

PHILINE ARGENTATA. T. ovato-quadrata, compressa, tenuissima, lucida, talcosa, concentricè undulata et lineis transversis argentatis insculpta; apice indentato, calloso labro posticè latè exstante, anticè subtruncato; plicâ columellari obviâ. Axis 6 mill.; diam. 5 millim. Inhabits Hakodadi Bay in sandy mud, 2–6 fathoms. W. S.

Very much like *P. scutulum*, Lovèn, except in its sculpture. Distinguished from *P. vitrea* by its off-standing lip and silvery grooves.

TORNATINA APICINA. T. minuta, cylindracea, elongata, alba, lineis incrementi tenuissimis insculpta; apice mammillatâ; anfr. 4, suturâ canaliculatâ. Apertura $\frac{3}{4}$ long. testæ, perangusta; plicâ columellari obsoletâ; labro lateraliter viso arcuato. Axis 5 millim.; diam. 2 millim. Inhabits Sydney Harbor. W. S.

The aperture is broader and the pillar fold less definite than in *T. fusiformis.*

CYLICHNA VILLICA. T. minuta, ovato-cylindracea utroque subconica, albo et ferrugineo cincta, lineis volventibus insculpta et pòsticè concinnè plicata; vertice latè perforato. Apertura angusta, labro vix apicem excedente; columellâ subperforatâ, plicâ obsoletâ. Axis 3; diam. 1.5 millim. China Seas. W. S.

Cylichna ellipsoidea. T. minuta, solida, elongato-elliptica, eburnea, transversim striatula; apice involuto latè umbilicato; labro apicem vix excedente, latè arcuato. Apertura perangusta, anticè acuta; columellâ brevi, validâ, plicâ modicâ; ventre callo copioso induto. Axis 3 millim.; diam. 1+ millim. Inhabits Loo Choo. W. S.

Cylichna regularis. T. satis magna, elliptica, elongata, alba, spiraliter insculpta, vertice obtuso latè perforato. Apertura perangusta, admodum anticè ampliata; columellâ incrassatâ, vix incurvatâ, imperforatâ; ventre calloso. Axis 9 millim.; diam. 4 millim. From Sydney Harbor. W. S.

Cylichna operosa. T. minuta, gracilis, cylindracea, virescens, polita, vel ad basim minutissimè circumstriata; vertice obtuso, amplissimè umbilicato. Apertura angusta, linearis; plicâ columellari conspicuâ, haud umbilicatâ. Axis 4 millim.; diam. 1 millim. From Hong Kong Harbor. W. S.

Cylichna læta. T. parva, ovata, elongata, lactea, nitida, transversim (sub lente) striata; vertice plerumque perforato. Apertura antrorsum ampliata; labro vix posticè producto; columellâ profundè incurvatâ, imperforatâ; plicâ satis conspicuâ. Axis 5 millim.; diam. 2 millim.

Inhabits Kagosima. W. S. A somewhat tumid, very symmetrical species.

Cylichna protracta. T. satis magna, solida, cylindracea, ossea, spiraliter insculpta; apice obliquè truncato carinato crateriformi perforato. Apertura angusta; labro recto posticè angulato; columellâ curtâ, solidâ, valdè plicatâ. Axis 12 millim.; diam. 5 millim. Coast of China. W. S.

Cylichna tubulosa. T. modica, elongata, cylindracea, deorsum sensim ampliata, albida, lævis vel potius (sub lente) lineis volventibus insculpta; vertice obliquè truncato crateriformi imperforato. Apertura perangusta, linearis; plicâ columellari conspicuâ. Axis 8 millim.; diam. vix 3 millim. Simon's Bay, Cape of Good Hope. W. S. Allied to *C. involuta*, A. Ad. but the outlines are more rectilinear.

Cylichna melampoides. T. minima, solida, ovata, eburnea, polita, anticè striis cincta; vertice obtuso, impresso, imperforato; basi acutè rotundato. Apertura antrorsum dilatata; labro vix reducto; columellâ curtâ, imperforatâ. Axis 4 millim.; diam. 2 millim. From China Seas. W. S.

CYLICHNA CONSOBRINA. T. cylindracea, abbreviata, anticè angustata, posticè truncata, solidula, albida epidermide fugacissimo induta, transversim striatula; vertice indentato, angulato. Apertura angusta, recta, labro ad apicem planulato; columellâ abbreviatâ, tortâ. Axis 6 millim.; diam. 2+ millim. Taken on the west coast of Jesso. L. M. Squires. Size and general form of *C. triticea*, but less rounded at extremities and pillar fold less obvious. *C. corticata*, Müll. is nearly the same.

ACTÆON SECALE. T. parva, elongato-ovata, tenuis, straminea, posticè polita vel lineâ subsuturali insculpta, anticè striis punctatis cincta; anfr. 4 tabulatis ultimo $\frac{3}{4}$ long. testæ: apice obtuso. Apertura $\frac{1}{2}$ long. testæ vix superans, auriculata, posticè acuta, anticè benè rotundata; columellâ conspicuè tortâ. Axis 4 millim.; diam. 2 millim. From the China Seas. W. S.

BUCCINULUS STRIGOSUS. T. ellipsoidea, elongata, solidula, sulcis volventibus punctatis arata, interspatiis fusco et albido catenatis, et fasciâ albidâ medianâ, suturali et anticali ornatâ; anfr. 5, ultimo $\frac{3}{4}$ long. testæ adæquante. Apertura $\frac{2}{3}$ long. testæ, perangusta; columellâ profundè excavatâ. Axis 8 millim; diam. 3 millim. Inhabits Loo Choo and Kagosima. W. S.

Remarkable for its small size and slender form. Some specimens are much shorter than others and nearly without the slaty lines; so that the species appears to be quite variable.

LIOTIA SOLIDULA. T. ovato-conica, depressa, solida, albida, modicè umbilicata ad 12-plicata, lirâ ad peripheriam, alterâ subsuturali, alterâ basali foveata; umbilico dentato; anfractibus quinque. Apertura verticalis; columellâ tenui, profundè abditâ; labro crasso simplici. Axis 5 millim.; diam. 8 millim. Dredged in 25 fathoms off the coast of China. W. S. Allied to *L. Peronii* and *L. cidaris*, but differing in the umbilicus.

LIOTIA LOCULOSA. T. parva discoidea, solida, cinerea; anfr. 4 citò crescentibus, benè discretis, ultimo ad peripheriam biangulato, costis ad angulos tubuloso-nodosis lyrato; suturâ crenulatâ; umbilico amplo, profundo. crenulato. Apertura circularis; labro reflexo quadricristato. Axis 2 millim.; diam. 5 millim. Inhabits Loo Choo. W. S.

LIOTIA FULGENS. T. parva, discoidea, aureo-margaritacea, laminâ calcareâ ochraceâ incrustata; anfr. 3+ citò crescentibus, ultimo ad peripheriam carinis binis acutis rufo-tessellatis cincto, interspatio concavo; subtus crateriformis. Apertura ampla circularis inferior; labro expanso, lobulato. Axis 2 millim.; diam. 5 millim.

Inhabits St. Simon's Bay, Cape of Good Hope. W. S. Very like *Delphinula bicarinata*, Ad. and Rv., which has a more elevated spire and unequal keels.

LIOTIA ASTERISCUS. T. minutissima, solida, alba, conica, costis elevatis acutis obliquis ad 20 sulco subsuturali sulco utroque ad peripheriam et sulco umbilicum ambiente aratis; anfr. 4 convexis. Apertura circularis; peristomate crasso duplici radiante; fauce margaritaceâ. Diam. 1.5 millim.; axis 1 millim. Inhabits Hong Kong. W. S. Very minute, but evidently adult and perfectly well characterized.

CYCLOSTREMA MODESTUM. T. parva, discoidea, solidula, lactea, supra convexiuscula, infra leniter concava, perforata; anfr. 4 sulcis volventibus clathratis cinctis quorum subsuturali majori. Apertura circularis; labro crenulato. Diam. 4 millim.; axis 2 millim. Inhabits Hong Kong. W. S.

Mr. C. J. Sprague presented the following:—

LIST OF PLANTS COLLECTED BY EMANUEL SAMUELS, IN SONOMA COUNTY, CALIFORNIA, IN 1856. BY ASA GRAY, M. D.

The plants named below were gathered by Mr. Samuels during a year's residence in California, and form part of the collections made under the auspices of the Boston Society of Natural History and the Smithsonian Institution at Washington. Mr. Samuels made collections in all the departments of Zoölogy and Botany, and the frequent rarities in his small but interesting collection bear testimony to his close observation and assiduity.

Although there are no undescribed species, several have been but recently discovered during the Pacific Railroad Exploring Expeditions, and are described in the Government Reports of those Expeditions.

1. Thalictrum dioicum, *L.?*
2. Ranunculus Californicus, *Benth.*
3. " repens, *L. var.*
4. Aquilegia Canadensis, *L.*
5. Delphinium nudicaule, *Torr. & Gr.*
6. Delphinium azureum, *Mx.*
7. " patens, *Benth.*
8. " simplex, *Doug. var.* strictum.
9. Delphinium decorum, *Fisch. & Mey.*
10. Eschscholtzia Californica, *Cham.*
11. Platystemon Californicum, *Benth.*
12. Nasturtium lyratum, *Nutt.*
13. Turritis glabra, *L.*
14. Cardamine paucisecta, *Benth.*
15. " tenuisecta, *Benth.*
16. Sisymbrium deflexum, *Harvey?*
17. Tropidocarpum scabriusculum, *Hook.*
18. Erysimum asperum, *DC.*
18 *a.* Erysimum elatum, *Nutt.*
19. Lepidium nitidum, *Nutt.*
20. Viola pedunculata, *Torr. & Gr.*
21. " sarmentosa, *Doug.*
22. " adunca, *Sm.*
23. Silene Gallica, *L.*
24. Alsine Douglasii, *Fenzl.*
25. Sagine procumbens, *L.*
26. Calandrinia Menziesii, *Hook.*
27. Claytonia perfoliata, *Don.*
28. Lewisia rediviva, *Pursh.*
29. Sidalcea diploscypha, *Gray.*
30. " malvæflora, *Gray.*
31. " humilis, *Gray.*
32. Linum Californicum, *Benth.*
33. Geranium Carolinianum, *L.*
34. Erodium macrophyllum, *Hook. & Arn.*
35. Erodium cicutarium, *L'Her.*
36. Oxalis corniculata, *L.*
37. " stricta, *L.*
38. Limnanthes Douglasii, *R. Br.*
39. Rhus Californica, *Nutt.*
40. " diversiloba, *Torr. & Gr.*
41. Mesembryanthemum dimidiatum, *Harvey.*
42. Vicia exigua, *Nutt.*
43. " truncata, *Nutt.*
44. " gigantea, *Hook.*
45. Lathyrus venosus, *Muhl.*
46. " polymorphus, *Nutt.*
47. Psoralea physodes, *Dougl.*
48. " orbicularis, *Lindl.*
49. Trifolium albopurpureum, *Torr. & Gr.*
50. Trifolium ciliolatum, *Benth.*
51. " tridentatum, *Lindl.*
52. " variegatum, *Nutt.*
53. " fucatum, *Lindl.*
54. Hosackia bicolor, *Doug. & Benth. var.* gracilis.
55. Hosackia parviflora, *Benth.*
56. " subpinnata, *Torr. & Gr.*
57. " Purshiana, *Benth.*
58. " gracilis, *Benth.*
59. Lupinus nanus, *Dougl.*
60. " micranthus, *Dougl.*
61. " densiflorus, *Benth.*
62. " latifolius, *Agardh.*
63. " ?
64. Thermopsis fabacea, *DC. var.* tomentosa.
65. Nuttallia cerasiformis, *Torr. & Gr.*
66. Acæna trifida, *Ruiz & Pav.*
67. Potentilla anserina, *L.*
68. " glandulosa, *Lindl.*
69. Fragaria Chilensis, *Ehrh.*
70. Rubus vitifolius, *Cham. & Schlecht.*
71. Cratægus sanguinea, *Pallas. var.* Douglassii, *Torr. & Gr.*
72. Œnothera densiflora, *Sm.*
73. " dentata, *Cav.*
74. " ovata, *Nutt.*
75. " cheiranthifolia, *Hornem.*
76. " Lindleyi, *Dougl.*
77. " purpurea, *Curtis.*
78. " decumbens, *Dougl.*
79. Clarkia elegans, *Lindl.*
80. Megarrhiza Californica, *Torrey.*
81. Tillæa minima, *Miers.*
82. Lithophragma parviflora, *Nutt.*

83. Lithophragma heterophylla, *Hook. & Arn.*
84. Bowlesia lobata, *Ruiz & Pav.*
85. Eryngium articulatum, *Hook.*
86. Sanicula bipinnatifida, *Dougl.*
87. " Menziesii, *Hook. & Arn.*
88. " laciniata, *Hook. & Arn.*
89. " arctopoides, *Hook. & Arn.*
90. Edosmia Gairdneri, *Torr. & Gr.*
91. Pencedanum leiocarpum, *Nutt.*
92. " caruifolium, *Torr. & Gr.*
93. Pencedanum utriculatum, *Nutt.*
94. " macrocarpon, *Nutt.*
95. Daucus pusillus, *Mx. var.* scaber, *Torr. & Gr.*
96. Osmorrhiza nuda, *Torr.*
97. Lonicera involucrata, *Banks.*
98. " Californica, *Torr. & Gr.*
99. Symphoricarpus occidentalis, *Br.*
100. Symphoricarpus ciliatus, *Nutt.*
101. Sambucus glauca, *Nutt.*
102. Galium Aparine, *L.*
103. " Californicum, *Hook. & Arn.*
104. Plectritis congesta, *Lindl.*
105. Erigeron Canadense, *L.*
106. " Douglasii, *Torr. & Gr.*
107. Solidago Californica, *Nutt.*
108. Grindelia hirsutula, *Hook. & Arn.*
109. Stylocline gnaphalioides, *Nutt.*
110. Psilocarphus tenellus, *Nutt.*
111. Blennosperma Californicum, *Fisch. & Mey.*
112. Wyethia angustifolia, *Nutt.*
113. Monolopia major, *DC.*
114. Burrielia chrysostoma, *Torr. & Gr.*
115. Burrielia gracilis, *DC.*
116. " uliginosa, *Gray.*
117. Helenium puberulum, *DC.*
118. Achyrachæna mollis, *Schauer.*
119. Layia (Callichroa) platyglossa, *Gray.*
120. Layia (Calliglossa) Douglasii, *Gray.*
121. Hemizonia congesta, *DC.*
122. Madia racemosa, *Nutt.*
123. " sativa, *Molina.*
124. Achillea Millefolium, *L.*
125. Matricaria discoidea, *DC.*
126. Chrysanthemum (introduced).
127. Artemisia Ludoviciana, *Nutt.* vel vulgaris, *var.*
128. Gnaphalium Californicum, *DC.*
129. " purpureum, *L.*
130. " luteo-album, *L.*
131. Senecio aronicoides, *DC.*
132. Echinais carlinoides, *Cass. var.* nutans (introduced).
133. Cirsium Californicum, *Gray.*
134. Calais Bigelovii, *Gray.*
135. " sylvatica, *Benth.*
136. Macrorhynchus retrorsus, *Benth.*
137. " heterophyllus, *Nutt.*
138. Sonchus oleraceus, *L.*
139. " asper, *Vill.*
140. Downingia elegans, *Torr.*
141. Githopsis calycina, *Benth. var.* hirsuta, *Nutt.*
142. Plantago maritima, *L.*
142 *a.* Plantago Patagonica, *var.* gnaphalioides.
143. Armeria vulgaris, *Willd. var.* Californica.
144. Dodecatheon Meadia, *L.*
145. Linaria Canadensis, *Dum.*
146. Scrophularia nodosa, *L.*
147. Collinsia bartsiæfolia, *Benth.*
148. " bicolor, *Benth.*
149. Mimulus (Diplacus) glutinosus, *Nutt.*
150. Mimulus luteus, *L.*
151. Eunanus Douglasii, *Benth.*
152. Veronica Anagallis, *L.*
153. " peregrina, *L.*
154. Castilleia hispida, *Benth.*
155. " Douglasii ?
156. Orthocarpus densiflorus, *Benth.*
157. " castilleioides, *Benth.*
158. " faucibarbatus, *Gray.*
159. " purpurascens, *Benth.*
160. Pedicularis attenuata, *Benth.*
161. Verbena prostrata, *R. Br.*
162. Monarda villosa, *var.* leptosiphon, *Torr.* (M. Sheltoni, *Torr.*)
163. Pogogyne Douglasii, *Benth.*
164. " multiflora, *Benth.*
165. Brunella vulgaris, *L.*
166. Salvia Columbariæ, *Benth.*
167. Scutellaria tuberosa, *Benth.*
168. " pycnantha, *Benth.*

169. Amsinckia spectabilis, *Fisch. & Mey.*
170. Eritrichium fulvum, *A. DC.?*
171. " Chorisianum, *DC.?*
172. " sp.
173. Cynoglossum grande, *Dougl.*
174. Nemophila parviflora, *Benth.*
175. " atomaria, *Fisch. & Mey.*
176. " insignis, *Benth.*
177. Phacelia tanacetifolia, *Benth. var.* tenuifolia, *Thurber.*
178. Phacelia circinata, *Jacquin.*
179. Eutoca divaricata, *Benth.*
180. Collomia gracilis, *Benth.*
181. Navarretia cotulæfolia, *Hook. & Arn.*
182. Navarretia leucocephala, *Benth.*
183. " squarrosa, *Hook. & Arn. var.*
184. Gilia achilleæfolia, *Benth.*
185. " multicaulis, *Benth.*
186. " androsacea, *Steud.*
187. " (leptosiphon), sp.
188. " sp.
189. Erythræa Muhlenbergii, *Griseb.*
190. Convolvulus Californicus, *Choisy.*
191. Solanum umbelliferum, *Eschsch.*
192. Chenopodium anthelminticum, *Linn.*
193. Eriogonum elongatum, *Benth.*
194. Chorizanthe pungens, *Benth.*
195. " Douglasii, *Benth.*
196. " sp.
197. Euphorbia dictyosperma, *Fisch. & Mey.*
198. Alisma Plantago, *L.*
199. Luzula campestris, *DC.*
200. Juncus bulbosus, *Pursh.*
201. " bufonius, *L.*
202. Sisyrinchium Bermudiana, *L.*
203. Iris macrosiphon, *Torr.*
204. Anticlea Fremontii, *Torr.*
205. Scoliopus Bigelovii, *Torr.*
206. Fritillaria lanceolata, *var.* floribunda, *Benth.*
207. Calochortus luteus, *Dougl.*
208. Allium acuminatum, *Hook.*
209. Brodiæa grandiflora, *Sm.*
210. " capitata, *Benth.*
211. " multiflora, *Benth.*
212. " congesta.
213. Seubertia laxa, *Kunth.*
214. Calliprora lutea, *Lindl.*
215. Cyclobothra elegans, *Lindl.*
216. Trillium ovatum, *Pursh.*
217. Carex, sp.
218. Scirpus lacustris, *L.*
219. Agrostis, sp.
220. Aira danthonioides, *Trin.*
221. Melica imperfecta, *Trin.*
222. Bromus carinatus, *Hook. & Arn.*
223. Elymus Canadensis, *L. var.*
224. Hordeum pratense, *Hudson.*
225. Sitanion elymoides, *Raf.*
226. Phalaris Californica, *Hook. & Arn.*
227. Kœleria cristata, *Pers.*
228. Polypodium intermedium, *Hook. & Arn.*
229. Adiantum Capillus-Veneris, *L.*
230. " Chilense, *Kaulf.*
231. Pteris aquilina, *L.*
232. Gymnogramma triangulare, *Kaulf.*
233. Aspidium argutum, *Kaulf.*
234. Funaria hygrometrica, *Hedwig.*
235. Ramalina Menziesii, *Taylor.*
236. Chorda filum.
237. Ceramium rubrum.
238. Rhodomenia laciniata.

List of a Collection of dried Plants made by L. J. Xantus, at Fort Tejon, and Vicinity, California, near Lat. 35°, and Long. 119,° 1857–8. By Asa Gray, M. D.

1. Clematis ligusticifolia, *Nutt.*
2. Delphinium Menziesii, *DC.*
3. Eschscholtzia Californica, *Cham.*
4. Eschscholtzia tenuifolia, *Benth.*
5. Dicentra (Chrysocapnos, *Torr.*) chrysantha, *H. & A.*
6. Meconopsis heterophylla, *Benth.*
7. Streptanthus heterophyllus, *Nutt.*

8. Erysimum asperum, *DC. var.* (elatum, *Nutt.*)
9. Raphanus sativus, *Linn.* "In cañons, &c."
10. Isomeris arborea, *Nutt.*
11. Viola pedunculata, *var.* petalis 2 superioribus extus præsertim fusco-purpureis.
12. Silene Californica, *Durand*, (*var.* of S. laciniata.)
13. Calandrinia Menziesii, *Hook.*
14. Claytonia perfoliata, *Don.*
15. Sidalcea malvæflora, *Gray.*
16. Fremontia Californica, *Torr.*
17. Erodium cicutarium, *L'Her.*
18. Frangula Californica, *Gray.*
19. Rhus diversiloba, *Torr. & Gr.*
20. Æsculus Californica, *Nutt.*
21. Lupinus microcarpus, *Sims.*
22. " bicolor, *Lindl.*
23. " leptophyllus, *Benth. var.* foliolis latioribus.
24. Hosackia Purshiana, *Benth.*
25. " scoparia, *Nutt.*
26. Cercocarpus parvifolius, *Nutt.*
27. Œnothera biennis, *L. var.*
28. " bistorta, *Nutt.?*
29. " tenella, *Cav.*
29 *a.* " rubicunda, *Lindl.*
30. Clarkia elegans, *Lindl.*

31. CLARKIA XANTIANA (sp. nov.): foliis linearibus seu lanceolatis; floribus quasi racemosis; calycis tubo ore villosissimo; petalis cuneatis altè bilobis cum lancinulâ subulatâ interpositâ deorsum in unguiculam latam edentatam sensim angustatis; staminibus 8 fertilibus; stigmatis lobis latè ovalibus brevibus; capsulâ sessili.—An interesting species from its holding an intermediate position between the original *Clarkia pulchella* and *C.* (*Phæostoma*, Spach.) *elegans*; the foliage (which, with the ovaries and flower-buds, is minutely cinereous-puberulent) resembling the former, as do the lobed petals, but here the middle lobe is reduced to a mere lacinula, and the broader and shorter claw is toothless; while the blossoms are racemosely disposed along the simple stem or branches as in *C. elegans*, in bud strongly drooping. There are no scales at the base of the filaments; but the throat of the short funnel-form tube of the calyx is evenly and densely bearded with villous hairs. Petals purple or pink, often with a deeper-colored spot toward the base of the blade. Capsules rather slender, sessile, or the lowest subsessile.

32. Zauschneria Californica, *Presl.*
33. Epilobium coloratum, *Muhl.*
34. Mentzelia albicaulis, *Dougl.*
35. Megarrhiza Californica, *Torr.*
36. Cicuta maculata, *L.*
37. Berula angustifolia, *Koch.*
38. Edosmia Gairdneri, *Nutt.*
39. Peucedanum utriculatum, *Nutt.*
40. Galium boreale, *L. var.*
41. Erigeron Douglasii, *Torr. & Gray.*
42. Balsamorhiza deltoidea, *Nutt.*
43. Leptosyne Douglasii, *DC.*
44. Helianthus lenticularis, *Dougl.*
45. Chœnactis glabriuscula, *DC. var.* megacephala, *Gray, in Pl. Whippl.*
46. Burrielia gracilis, *DC.*
47. Bahia confertiflora, *DC.*
48. " Wallacei, *Gray, in Pl. Whippl.*
49. Monolopia major, *DC.*
50. Layia gaillardioides, *Hook. & Arn. var.* pappo albo; foliis pinnatifidis.

51. Madaria corymbosa, *DC.*	57. Arctostaphylos glauca, *Lindl.*
52. Achillea Millefolium, *L.*	58. Collinsia bicolor, *Benth.*
53. Senecio Douglasii, *DC.*	59. " " *var.* parviflora.
54. Sonchus asper, *Vill.*	60. Scrophularia nodosa, *L.*
55. Calais linearifolia, *DC.*	61. Pentstemon centranthifolius, *Benth.* fol. latioribus.
56. Macrorhynchus grandiflorus, *Nutt.*	

62. Pentstemon breviflorus, *Lindl. var.* Shrubby; lower leaves short (half an inch or less in length,) oblong or somewhat obovate, very obtuse; sepals glandularvillous (as they are, less conspicuously, in Douglas's specimens); corolla strongly bearded, especially at the summit of the lobes, with long and glandular hairs. The expression "labio superiore villoso" does not adequately express it.

63. Pentstemon ternatus (*Torr. in Mex. Bound. Surv.*) glaber, basi fruticosus; caulibus floridis ramisve virgatis simplicissimis glaucis; foliis ternato-verticillatis lineari-lanceolatis (pollicaribus) utrinque acutis subsessilibus rigidis cartilagineo-serratis denticulatisve, floralibus subulatis; paniculâ angustatâ; calyce (segmentis lanceolato-ovatis) pedicellisque glanduloso-puberis; corollâ (purpureâ? extus pruinoso-puberulâ) longè cylindricâ, limbo brevi, labiis æquilongis, superiore oblongo erecto apice bifido, inferiore tripartito, segmentis patentibus angustè oblongis; filamento sterili corollâ dimidio breviore hinc valdè barbato.—Stems or simple branches slender, one or two feet long, leafy to the inflorescence, the leaves about the length of the internodes. Flowers in a virgate panicle. Tube of the corolla an inch long, only two lines in diameter, scarcely ampliate at the summit, the lobes and upper lip only three lines long. Fertile filaments glabrous except at their base, where they are sparsely hirsute; anthers scarcely exserted, glabrous; sterile filament very strongly bearded on the posterior side for its whole length. A very distinct species of Bentham's section *Elmigera;* the leaves in threes in all the specimens.

64. Pentstemon lætus (sp. nov.): pallidus, puberulus, supernè glandulosus; caulibus subpedalibus adscendentibus; foliis integerrimis crassiusculis, inferioribus spatulatis seu oblanceolatis in petiolum marginatum attenuatis, superioribus oblongo-lanceolatis basi latâ arctè sessilibus, floralibus parvis; paniculâ laxâ; pedunculis sæpius trifloris; calycis segmentis oblongis herbaceis immarginatis; corollâ cœruleâ supernè campanulato-

ampliatâ, lobis rotundatis subæqualibus; antheris (§ Saccantheræ) rimâ hispido-ciliatis juxta insertionem villosulis; filamento sterili glaberrimo apice dilatato.—A depauperate specimen of this is what, in the account of Lieut. Beckwith's collection, (Pacific Railroad Explorations, 2, p. 122,) I doubtfully referred to *P. heterophyllus*. It proves to be a very distinct species of the same section, and a handsome one, the (apparently bright blue) corolla over an inch in length.

65. Mimulus cardinalis, *Dougl.*
66. " luteus, *Linn.*
67. Eunanus Fremonti, Benth. *var.*
68. Castilleia affinis, *Hook. & Arn.*
69. " hispida, *Hook. & Arn.*
70. " candens, *Durand & Hilgard, in Pacif. R. R. Expl.* 5, pp. 12, 13?
71. Castilleia linariæfolia, *Benth.* (Folia floralia sæpius trifida; calyx posticè etiam bifidus; corolla nunc bipollicaris.)
72. Orthocarpus purpurascens, *Benth.*
73. Solanum umbelliferum, *Eschsch.*
74. Datura meteloides, *DC.*
75. Nicotiana, n. sp.? N. plumbaginifolia, *var.?* Bigelovii, *Torr. in Pacif. R. R. Expl.* 4, p. 127.
76. Mentha Canadensis, *Linn.*
77. Monardella candicans, *Benth.*
78. Salvia Columbariæ, *Benth.*
79. " carduacea, *Benth.*
80. Stachys pycnantha, *Benth. & var.* foliis albo-tomentosis.
81. Amsinckia spectabilis, *Fisch. & Meyer.*
82. Amsinckia spectabilis, *var.* minor.
83. Eritrichium fulvum, *A. DC.*
84. Krynitzia leiocarpa, *Fisch. & Meyer.*
85. Eritrichium angustifolium, *Torr. in Pacif. R. R.* 5, p. 363.
86. Eritrichium, n. sp.? too young to characterize.
87. Nemophila insignis, *Dougl.*
88. Ellisia membranacea, *Benth.*
89. Phacelia circinata, *Jacq.*
90. " tanacetifolia, *Benth.*
91. " " *var.* tenuifolia, *Thurber.*
92. Phacelia ramosissima, *Benth.* forma evoluta.
93. Emmenanthe penduliflora, *Benth.*
94. Eriodyction tomentosum, *Benth.*
95. Gilia densifolia; etiam G. elongata. *Benth.*
96. Gilia achilleæfolia, *Benth.*
97. " tricolor, *Benth.*
98. " (Linanthus) dichotoma, *Benth.*
99. Gilia (Leptosiphon) androsacea, *Benth.*
100. Apocynum cannabinum, *Linn.*
101. Acerates (Anantherix) tomentosa, *Torr. Mex. Bound. Surv.*
102. Asclepias fascicularis, *Decaisne.*
103. Mirabilis (Quamoclidion) multiflora, *Torr.*
104. Blitum Bonus-Henricus, *Moq. var.* (Chenopodium anthelminticum, *var.?* hastatum, *Moquin.*)
105. Eriogonum polifolium, *Benth.*
106. " angulosum, *Benth.*
107. Chorizanthe procumbens, *Nutt.* (An C. staticoides, *var.?*)

108. Chorizanthe (Mucronea) perfoliata (sp. nov.): glabella; foliis chartaceis, caulinis triangulatis trilobisve sæpissimè perfoliatis; involucro tetraquetro quadridentato, dentibus subæqualibus subulato-aristulatis; perigonii segmentis exterioribus 2–4–dentatis leviter erosis, interioribus magis laciniato-fim-

briatis.—Repeatedly dichotomous from the annual root, divaricate-diffuse, a sessile and solitary involucrum in each fork; on the branchlets the involucres rather crowded and somewhat spicate or panicled, through the less forking and the gradual reduction of the leaves to bracts. Radical leaves spatulate. The cauline leaves are larger, less lobed, more amplexicaul, (and most of them really perfoliate,) and the angles or lobes less awn-pointed than in *C.* (*Mucronea*, Benth.) *Californica;* the four triangular teeth of the involucre also tipped with a shorter awn, not exceeding the perigonium when that is fully developed; the divisions of the latter, especially the three inner ones, conspicuously fimbriate-laciniate. Otherwise this plant closely resembles Bentham's *Mucronea Californica*, and confirms his doubts of the distinctness of the genus from *Chorizanthe*, notwithstanding the peculiarity of habit. *Centrostegia*, with a similar habit, is distinguishable only by the spurred appendages of the involucrum, and is probably to be reduced, along with *Mucronea*, to a section of *Chorizanthe*. To this, however, does not belong Remy's *C. commissuralis*, which differs from true *Chorizanthe* merely in the laxer inflorescence. *Acanthogonum*, Torr. (which has a short-pedicelled flower and nine stamens,) is an interesting link, plainly connecting *Lastarriæa*, Remy, with the other Eriogoneous genera. The verticillate upper leaves of the latter answer to the involucre, which, however, incloses a proliferous shoot as well as a flower.

109. Anemonopsis Californica, *Nutt.*
110. Euphorbia albomarginata, *Torr.* (E. stipulacea, *Engelm.*)
111. Quercus lobata, *Née*, (Q. Hindsii, *Benth.*) Foliage only.
112. Ephedra antisyphilitica, *Berl.*
113. Epipactis Americana, *Lindl.*
114. Brodiæa capitata, *Benth.*
115. Calliproa lutea, *Lindl.*
116. Tritelia laxa, *Lindl.*
117. Calochortus venustus, *Benth.*
118. Juncus xiphioides, *E. Meyer.*
119. Polypogon Monspeliensis, *Linn.*
120. Triticum repens, *Linn.*
121. Elymus dasystachys, *Trin. ex Munro in Pl. Hartw.*, p. 342, (= forma luxurians, *Hartw.* No. 2032.)
122. Allosorus andromedæfolius, *Kaulf.*

Dr. C. T. Jackson announced that the wax-plant of Japan (*Rhus succedaneum*) had been made to vegetate at the forcing houses in Washington; it grows there vigorously, and will doubtless prove suitable for the Southern States generally. He also stated that the experiment of the introduction of the tea-plant bids fair to be successful in the United States.

An engraving of Linnæus, at the age of twenty-five, in his Lapland costume, was presented in the name of Mr. William Sharswood, of Philadelphia. It was executed in Berlin, from a photograph taken from an oil painting in the Library of the Zoölogical Society at Amsterdam. It represents the young naturalist holding in his hand the plant *Linnæa borealis*, and with his girdle ornamented with various botanical and entomological implements.

September 7, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Mr. T. J. Whittemore read some notes taken at Mohawk, Herkimer Co., N. Y., in August, 1859.

Mohawk is situated on the delta of what was probably a considerable stream, at an early period, flowing into the Mohawk valley, and may have been a lake or estuary; Fulmer's creek, on which it is situated, is now a small mountain stream. Dr. Lewis, in Vol. 6 of the Proceedings, gives 87 species of 17 genera of shells found in this region, embracing Little Lakes, and Schuyler's Lake; 18 species have since been added.

"Little Lakes," in Warren township, are 800 feet above the river, the area of which formerly extended over much which is now swamp, underlaid with soil of the same character as the bottom of the lakes. The upper of the two lakes is about three quarters of a mile long, and its whole bottom is of marl, and filled with living and dead shells, many of which are fossil. This marl is 14 feet deep, by examination; the lake is shallow, and furnishes fine pickerel and other fish, and numerous shells,—the lower lake contains more of a black muck bottom; the shells, fishes, and reptiles are the same in both lakes, but the shells grow larger in the upper, and the reptiles are more numerous in the lower. At Schuyler's Lake the reptiles, fishes, and shells are the same as in the former, with the addition of an *alasmodon*, *anodon*, *unio*, and *lymnea;* the last, *L. gracilis*, is found on the bulrushes, flags, and lily pads, from one to two feet from the water; the specimens were about half grown, being perfect about the middle of October.

Dr. C. T. Jackson alluded to the occurrence of white marl in the bottom of a pond in New Hampshire, the water flowing into which from a peat bog is highly charged with crenate of lime; this he thought the source of the marl, and perhaps, by decomposition, of the carbonate of lime in the living shells.

Dr. Hayes alluded to the above action of peat waters on lime as exceedingly interesting; it may be noticed wherever dark waters are changed into green-colored. In waters highly charged with crenate and humate of ammonia, there is found a great increase in the numbers of shells. Crenic acid is an important world-builder and world-destroyer; it is found in all sea-water, especially in that from great depths, combined with lime. Carbonate of manganese is attacked by crenic acid, and waters containing this acid, flowing over manganese rocks, always become darker.

Mr. Putnam presented, in the name of Prof. Agassiz, 30 species of fishes from the Sandwich Islands, all new to the cabinet, and about one half of them undescribed.

Dr. Kneeland presented a paraffine candle made from the cannel coal of Boone Co., Kentucky, a specimen of which was presented by Mr. J. W. Richardson some months ago.

Dr. Hayes observed that this coal deserves rather the name of a compound rock, being full of minute spangles of mica interspersed with the vegetable matter of the coal; on this account it leaves more ash. This structure indicates that the coal was deposited during a period of extreme quiet, the humus being carried slowly along with the mica scales. It yields paraffine in the first stage of distillation, being an educt, not a product, actually existing as a wax and capable of being traced back to wax-bearing plants; by distilling the coal, we get back the wax. These candles are made at New Bedford, by a patent process, and are far superior to those of foreign manufacture, inasmuch as there is no admixture of other matters, and a fine and regular crystallization is obtained by alternations of sudden and gradual cooling. From this coal is also obtained a thin, light, kerosene oil of superior quality, — a fluid paraffine. It is worthy of note that from this coal we obtain the aerial burning gas, the solid paraffine, and the fluid kerosene, — the three forms of illuminating materials.

Dr. C. T. Jackson stated that a locality containing tin ore had been discovered at Los Angelos, California, within the limits of the United States; the quantity of ore is very large, and it yields 60½ per cent. of oxide of tin, with brown oxide of iron.

Dr. Jackson also alluded to the quantity of saccharine matter in our native grapes; he had recently experimented with one, the Henshaw grape from Virginia, which he had found to contain 15½ per cent. of grape sugar; it will probably make a good claret wine.

Dr. J. Mason Warren presented an engraving of his father, Dr. John C. Warren, President of the Society from 1847 to 1856.

Mr. Chamberlain exhibited a living embryo skate within the egg-case.

The Corresponding Secretary read the following letters, viz:—

From Richard Hill, Jamaica, March 1, 1859, accepting membership, and presenting Mr. Gosse's two volumes on the Natural History of Jamaica; Académie des Sciences, Arts, et Belles-Lettres de Dijon; Académie Imperiale des Sciences de Russie, St. Petersburg, June 16, 1859; Imperial Mineralogical Society, St. Petersburg, October 10, 1858, acknowledging the receipt of the publications of the Society; Verein für vaterländische Naturkunde in Württemberg, Stuttgart, December 5, 1858; Société de Physique et d'Histoire Naturelle de Genève, November 20, 1858, acknowledging the same, and presenting their own publications; K. Akademie der Wissenschaften, Wien, January 22, 1859; Oberhessischer Gesellschaft für Natur-und-Heilkunde, Giessen, March 30, 1859, presenting their publications; Société de Geographie, Paris, July 31, 1856, acknowledging the receipt of the Society's publications, and asking for previous numbers; H. Davis, July 9 and August 8, concerning collection of specimens, &c.

Messrs. William Sharswood of Philadelphia, and Arthur M. Edwards of New York, were elected Corresponding Members.

September 21, 1859.

T. J. Whittemore, Esq., in the Chair.

A letter from Mr. William Edwards, of South Natick, Mass., to the President, on the phenomena of vibrating dams, was read, by vote of the Society.

His observations and experiments had been made during nearly every day for fourteen months, ending with February last, upon the waterfall in that village. The phenomena there observed are not confined to the vertical sheet, but may be traced in any rapid stream of water, in the bed of which an obstruction is placed; the waves or nodes below such an obstruction are identical with those of a vertical sheet obstructed by a dam. The nodes describe the form of the surface, and never move from their place except by an increase or decrease of the amount of water above the obstruction; by sinking this last the distance between the nodes is increased, by raising it they become more frequent. If we excite a wave above that will float over an increased amount of water, the nodes will move down till the wave has passed away, when they suddenly come back into place. When we cause these waves to follow in rapid succession, we have, in the descent and return of the nodes, a perfect miniature of the vibrating sheet,—the same effect is often produced by the friction of the water over the obstruction.

The letter was acompanied by sketches representing the nodes from an obstruction in the bed of the stream, and from a dam,—the latter in the vertical sheet, across which they extended, being 3 and 5, the number being governed by the depth of the water at the dam.

To produce a vibrating sheet, these nodes must first be set in motion, which is done by the waves caused by the friction of the water on the dam. If we count these waves as they pass the edge of the dam, and the vibrations of buildings in the vicinity, they are found always to correspond. With 10 inches of water flowing over the dam, we have 3 nodes on the sheet, and 280 vibrations per minute; with 8 inches, 4 nodes and 300 vibrations; with 7 inches, 5 nodes and 335 vibrations; with 5 inches, 8 nodes and over 400 vibrations.

The appearance of a vibrating sheet is very changeable under different reflections of light. At one time the downward motion is alone visible, giving the impression that the nodes are constantly forming and falling; a few hours after, the upward motion only is seen, indicating that the agitation of the sheet proceeds from the bottom; at other times the descent and return of the nodes are alike visible.

The vibrations of buildings near the dam often cease by a want of synchronous action of the whole sheet, or by heavy waves from above the dam. After the freshet in June, 1858, the water was of a dark greenish yellow color, and deposited a thick coating of slimy matter upon the edge of the dam, which prevented any friction; consequently all vibrations ceased for several weeks, notwithstanding the water passed the most favorable points for producing them.

A series of long-continued and careful experiments has convinced him that the sheet is of the concavo-convex form. This may be demonstrated by viewing the sheet from both sides, or by detaching a portion of it. If a strip of cambric be attached to the obstruction, it assumes the form of the upper surface, showing the concavity of the lower directly opposite to the convexity of the upper surface.

On account of flush-boards on the dam, it has been necessary to suspend for a time a series of experiments for determining the manner in which buildings are affected by the vibrating sheet.

Mr. Edward S. Rand, Jr., presented, through Mr. Sprague, an account of his experiments with the Japan wax-plant (*Rhus succedaneum*).

A few seeds of this plant, received by his father, were sown in the usual soil for seeds (peat, leaf mould, and silver sand,) and placed on a sunny shelf in the greenhouse, where they were well watered; they were very slow in germinating, but at length came up plentifully; after some weeks they were potted off in small pots, and have since grown quite vigorously. They are now from two to six inches high; the leaf is very different from that of any of the family with which he is acquainted, resembling more that of some of the new spireas; as far as can be judged, the plant will be one of great symmetry and beauty; he hopes by care to fruit it, and will then report further to the Society.

In relation to orchids or air-plants, of which he has a fine collection, he said that he had tried to preserve their magnificent flowers in spirit, with the intention of making an extensive collection; but in a few days or weeks the colors fade, or even disappear, leaving nothing of beauty except the form of the flower. He presented a flower of *Acanthophippium bicolor*, in which the fresh colors are black, white, and yellow, changed to a uniform white in spirit. He offered to preserve a large number of species, if any liquid could be found which would not destroy the colors.

Mr. F. H. Storer remarked that a solution of glycerine and water will preserve the colors of fishes, and he believed would be equally efficacious in the case of plants.

Mr. Sprague presented three specimens of the short or trout-nosed pickerel, varying in length from 12 to 20 inches, taken in Charles River, in the town of Wayland; this species, called in some localities the mud pickerel, is found in muddy-bottomed streams, especially where they empty into rivers, and is rarer than the long or shovel-nosed species.

Mr. Putnam observed that the large size of these fishes proves that the *Esox fasciatus* (Dekay) is not the young of *Esox reticulatus* (Lesueur); the latter is most frequently found in ponds.

Dr. A. Snowden Piggott, of Baltimore, was elected a Corresponding Member of the Society; and Mr. John Homans, Jr., of Boston, Resident Member.

DONATIONS TO THE MUSEUM.

July 6, 1859. Thirty species of crustacea, from the Bahama Islands; by Dr. Henry Bryant. Twenty-four slides of microscopic objects; by E. Samuels. Male, female, nest, and four eggs of *Ammodromus Henslowi*, Aud., from Berlin, Mass.; by Mr. E. S. Wheeler. A star-nosed mole, from Roxbury; by Mr. J. Champney. A sand-hill crane, *Grus Canadensis;* raven, *Corvus carnivorus;* three-toed woodpecker, *Picoides arcticus;* pine grosbeak, *Pinicola Canadensis*, male and female; four crossbills, *Curvirostra Americana*, two males and two females; a golden-winged woodpecker, *Colaptes auratus*, and longspur, *Plectrophanes lapponicus;* from Portage Lake, Lake Superior; by Dr. S. Kneeland, Jr. Two skulls of the loggerhead turtle, from the Bahamas; by Dr. Henry Bryant.

July 20, 1859. Fishes, an ascidian, and a crab, from the Sandwich Islands; by Dr. C. F. Winslow. A star-fish, *euryale*, from Boston harbor; by Mr. Kilby Page.

September 7, 1859. Fishes, reptiles, insects, shells, and minerals, from Mohawk, N. Y.; by Dr. James Lewis and Mr. T. J. Whittemore. Twenty-one species of crustacea, from the Sandwich Islands; by Prof. Agassiz. Crustacea, from Cape Cod; by Mr. Albert Ordway. Twenty-three species of land shells, from the vicinity of Bombay; by Dr. Simeon Shurtleff. Thirty species of fishes, from the Sandwich Islands; by Prof. Agassiz. A male *Corydalis cornutus*, from Roxbury; by Louis Lehmann. A caterpillar of a sphinx moth, covered with pupa cases of ichneumon fly, from Jamaica Plain; and a paraffine candle; by Dr. S. Kneeland, Jr. Male and female yellow-shouldered sparrow, *Coturniculus passerinus*, with egg; and two caterpillars; from Berlin, Mass.; by Mr. E. S. Wheeler.

September 21, 1859. Specimens of short-nosed pickerel from Wayland, Mass.; by Mr. C. J. Sprague. A white-tailed remora, *Echeneis albicauda*, from Holmes's Hole; by Mr. J. S. Fay. Fishes, reptiles, insects, and crawfishes, from Kansas; by Dr. Thos. H. Webb. A humming-bird, *Trochilus colubris*, killed by the frost; by Dr. T. M. Brewer. Young *Cottus Virginianus* from Cohasset; by Dr. S. Kneeland, Jr. Pomocentroid fishes from Zanzibar; by Prof. Agassiz. A phalarope, *Phalaropus hyperboreus*, and solitary tattler, *Rhyacophilus solitarius* from Cohasset; by Mr. P. S. Tyler.

BOOKS RECEIVED DURING THE QUARTER ENDING SEPT. 30, 1859.

Seventh Supplement to Dana's Mineralogy. By the Author. 8vo. Pamph. pp. 119–144. *From the Author.*

A Chapter on Fossil Lightning. By George D. Gibb, M. D., &c. 8vo. Pamph. London, 1859. *From the Author.*

Index to the Catalogue of a portion of the Public Library of the City of Boston. 8vo. 1858. *From the Trustees of the Public Library.*

On the Distribution of the Forests and Trees of North America, &c. By J. G. Cooper, M. D. 8vo. Pamph. *From the Author.*

The Naturalist in Bermuda. By J. M. Jones. 12mo. London, 1859. *From the Author.*

Comets; their Constitution and Phases. 8vo. Pamph. By C. Kemplay. London, 1859. *From the Author.*

A Naturalist's Sojourn in Jamaica. By P. H. Gosse. 12mo. London, 1851.

Birds of Jamaica. By P. H. Gosse. 12mo. London, 1847. *From Hon. Richard Hill.*

Bibliographia Librorum Entomologicorum in Americâ boreali editorum. Auct. Guil. Sharswood. 8vo. Pamph.

Catalogus Coleopterorum Europæ. 8vo. Pamph. Stettin, 1858. *From William Sharswood.*

Proceedings of the Academy of Natural Sciences of Philadelphia. Sigs. 13 and 14. 1859.

Memoirs of the American Academy of Arts and Sciences. Vol. VI. No. 2. 4to. Boston, 1859.

Proceedings of the same. Vol. IV. pp. 89–248. 8vo. Boston, 1859.

Canadian Journal of Industry, Science, and Art. No. 21, for May, and No. 22, for July, 1859.

New York Journal of Medicine. Nos. 97 and 98. 1859.

Proceedings of the Zoölogical Society of London. With Illustrations. Part XXVI. 8vo. 1858.

Thesaurus Conchyliorum. By G. B. Sowerby. Part XIX.

Canadian Naturalist and Geologist. Vol. IV. No. 4, for August, 1859. Montreal.

Journal of the Elliott Society of Natural History. Vol. I. Articles 1 and 2. 4to. Charleston, S. C.

Journal of the Royal Dublin Society. No. 14, for July, 1859.

Silliman's American Journal of Science and Arts. No. 82, for July, and No. 83, for Sept. 1859. New Haven.

Bulletin de la Société Paleontologique de Belgique. I. Feuilles 1–4. 8vo. Anvers, 1859.

Annual Report of the Trustees of the New York State Library. 8vo. Pamph. Albany, 1859.

Proceedings on Laying the Corner Stone of the Free Public Library in New Bedford. 8vo. New Bedford, 1856.

Kaiserliche Akad. der Wissenschaften. Sitzungsberichte Math-naturw. classe. Nos. 1–26. Kreil's Anhang. 8vo. Denkschriften Math-naturw. Band XIV. XV. 4to. Wien.

Almanach, 1858. 12mo. Wien.

Jahrbücher der Centralanstalt für Meteorologie. Band V. 4to. Wien.

Festrede bei der Feierlichen Übernahme, &c. Dr. T. G. Von Karajan. 8vo. Pamph. Wien.

Die Principien der Heutigen Physik. Dr. A. Ritter v. Ettingshausen. 8vo. Wien.

Genera of Recent Mollusca. No. 4. 8vo. London.

Mémoires de l'Académie Imperiale des Sciences, &c., de Dijon. 2ieme Serie. Tome VI. Année 1857.

Proceedings of the Royal Geographical Society. Vol. 3. Nos. 1, 2, and 3. 8vo. London, 1859.

Siebenter Bericht der Oberhessischen Gesellschaft für Natur-und Heilkunde. 8vo. Pamph. Giessen, 1859.

Württembergische Naturwissenchaftliche Jahreshefte. 1, 2, 1859. 8vo. Pamph. Stuttgart.

Jahrbuch der K.-K. Geologischen Reichsanstalt. IX. Nos. 1, 2, 3. 1858. 8vo. Wien.

Archiv für Naturgeschichte. Gegründet von A. F. A. Wiegmann. Fortgesetzt von W. F. Erichson. Vol. 24. Nos. 3, 4. 8vo. 1858. Berlin.

Mémoires de la Société de Physique et d'Histoire Naturelle de Genève. 4to. Tome XIV. 2de partie. Genève, 1858.

Leeds Philosophical and Literary Society. Annual Report. 8vo. Pamph. 1857–8.

Report of the Proceedings of the Geological and Polytechnic Society of the West Riding of Yorkshire. 8vo. Pamph. Leeds, 1857–8.

Gelehrte Antzeigen. 45, 46. 4to. München, 1857–8.

Nachrichten von der Georg-Augusts-Universitat. 12mo. Pamph. Göttingen, 1858.

Monatsbericht der K. Preussischen Akademie der Wissenschaften zu Berlin. July to Dec. 1858. 8vo. Berlin.

Proceedings of the American Philosophical Society. Vol. VII. No. 61. January–June, 1859.

Memoirs of the Geological Survey of India. Vol. I. Part 2. 8vo. Calcutta, 1858.

Flore Illustrée de Mucedinées d'Europe. Par A. C. J. Corda. Folio. *Received in Exchange.*

Report on Crustacea. By J. D. Dana. U. S. Exploring Expedition. 3 vols. 8vo. and 1 fol. Plates.

Owen, Richard; On the Classification and Geographical Distribution of the Mammalia. 8vo. London, 1859.

Annals and Magazine of Natural History. Nos. 17, 19, 20, and 21. London, 1859. *From the Courtis Fund.*

Popular Geology. By Hugh Miller. With a Resumé of the Progress of Geological Science, by Mrs. Miller. 12mo. Boston, 1859.

Curiosities of Natural History. By F. T. Buckland. 8vo. New York, 1859.

Country Life: a Handbook of Agriculture, Horticulture, and Landscape Gardening. By R. Morris Copeland. 8vo. Boston, 1859.

Life of Jonathan Trumbull, Sen. By J. W. Stuart. 8vo. Boston, 1859.

Irving's Life of Washington. Vol. V. 8vo. New York, 1859.

Life of Frederick Schiller. By T. Carlyle. 12mo. Philadelphia, 1859.

Encyclopædia Britannica. Vol. XVIII.

Acadia. By F. S. Cozzens. 12mo. New York, 1859.

Carlyle's History of Frederick the Great. Vols. 1, 2. 12mo. New York, 1859.

Memoir of the Empress Catherine II., written by herself. 12mo. New York, 1859.

Leaves from the Note-Book of a Naturalist. By W. J. Broderip. 8vo. Pamph. Boston, 1859.

Oliver Cromwell's Letters and Speeches. By T. Carlyle. 2 vols. 8vo. New York, 1858.

Queens of Scotland. By Agnes Strickland. Vols. 6, 7, 8. New York, 1859.

The French Revolution of 1789. By J. S. C. Abbot. 8vo. New York, 1859.

Perry's Expedition to Japan. 8vo. New York, 1856.

Washington in Domestic Life. By R. Rush. 8vo. Philadelphia, 1857.

Life of J. Montgomery. By H. C. Knight. 12mo. Boston, 1857. *Deposited by the Republican Institution.*

October 5, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Dr. C. F. Winslow read a paper on "Geological Revolutions."

A communication was read from Mr. George Curtis, of Newton Lower Falls, on the habits of the trout or short-nosed pickerel, (*Esox fasciatus.* Dekay.)

It is generally found either in what are called "water-bushes," (*Cephalanthus occidentalis,*) or in pickerel-weed. During dog-days, when other pickerel are found at the bottom in the channel, these are taken in the same localities that they frequent at all seasons, and are rarely, if ever, taken in the deep channel water. They take the bait with great eagerness, and, turning abruptly, make back into the shallow coverts whence they darted. The long-nosed species, on the contrary, moves to the deep water, there to devour its prey. They take the bait readily at all seasons and all times of day, being much more voracious than the other species; the same individual is frequently caught after having been several times drawn from the water. They live longer out of water, and remain flaccid for a greater length of time after death; their sight is much stronger, and they move quicker. In warm weather, and in certain localities, it is necessary to trail deep and slow for the shovel-nosed pickerel, or they will refuse the bait, — and even then the bait must be of a kind they specially prefer; the trout-pickerel, on the contrary, will take almost any bait, at the surface or beneath it, moving fast or slow; its voracity is such, that it is known to take the bait with the tail of a yet undigested fish visible in its mouth.

Dr. C. T. Jackson exhibited some crystals of green feldspar, from the sea-wall, near Southwest Harbor, Mount Desert, Maine.

It is found crystallized in quartz veins and pockets, near the shore, in a rock exceedingly hard. It is abundant, and some crystals are found four inches square, polished by the sea water. Heretofore this has only been found in Siberia, and is considered rare and valuable. It admits of a high polish, and is valued as a gem under the name of "Amazon Stone." Crystals of yellow feldspar were also found in this locality; both by Dr. W. F. Channing.

Dr. Jackson also exhibited specimens received from M. Daubrèe, of Strasbourg, of the minerals artificially produced by his process referred to at the meeting of April 6, 1859, — *viz.* chabasie, apophyllite, harmotome, and quartz crystals. The bricks from the old Roman works, acted upon by the hot waters of Plombières, as well as the cement, displayed zeolitic minerals in their interstices. The specimens of quartz were microscopic, but were pronounced by Dr. Bacon to be quartz crystals, whose sharp angles show that they could not have been dissected out of the glass matrix.

Among some specimens recently received from Oregon Territory, was a piece of a meteorite containing crystals of olivine, yielding 9 per cent. of nickel. It was identical in appearance, and probably in composition, with the Pallas meteorite of Siberia; he thought it not improbable that pieces may have fallen in the same meteoric shower in both countries, as has happened in other instances, though less widely separated.

Dr. Jackson read a letter from Emilien de Wael, of Antwerp, asking that deficiencies in his copy of the Society's Journal might be supplied, and also soliciting recent and especially freshwater species from this country: it was referred to the Committee on Publications and to the Curator of Conchology.

Dr. Kneeland exhibited a growing specimen of *Testudinaria elephantipes*, an endogenous plant of the family *Dioscoreaceæ*, and a native of South Africa.

Mr. Samuels presented a series of thirty microscopic slides, to be used for purposes of exchange with the London Microscopical Society. They were referred to Dr. Durkee, Mr. Stodder, and the Committee on Publication.

October 19, 1859.

The President in the Chair.

Dr. Gould presented descriptions of shells, collected by the North Pacific Exploring Expedition, as follows: —

PATELLA GRATA. T. ovato-conica, elevata, apice acuto admodum antico, extus rudis, cinerea, costis elevatis compressis juxta marginem tubulosis radiata; margine expanso denticulato;

intus ochracea fusco variegata, spatulâ et submargine intensè castaneis. Long. 30 millim.; lat. 24 millim.; alt. 14 millim. From the north shores of Niphon. Mr. Brooke.

PATELLA PALLIDA. T. obliquè pyramidata, cinerea, rudis, apice parum antico, costis inequalibus rotundatis variè dispositis ad 20 instructa; apertura rotundato-ovata, margine indentato, submargine cinereo, cavositate porcellano, spatulâ haud coloratâ. Long. 40, lat. 33, alt. 30 millim. Inhabits Hakodadi Bay, on stones and gravel, 10 fathoms. W. S.

ACMÆA DORSUOSA. T. ovoidea, rudis, costis inequalibus angustis humilibus tuberculatis ad 20 instructa; apice antico, acuto decurvato; intus virescens, spatulâ (centro plerumque excepto) castaneâ, margine ferè integro ad costas castaneo. Long. 20, lat. 15, alt. 10 millim.

Habitat, Hakodadi on rocks of 2d and 3d laminarian zone. W. S. Closely allied to *A. patina*, or that variety of it named *monticula* by Nuttall. The apex is more central, ribs more tubercular and less angular.

SCUTELLINA UNGUIFORMIS. T. parvula, alba, lucida, rotundato-elliptica, depressè fornicata, apice minuto deflecto, paginâ externâ striis concentricis et radiantibus minutissimis decussatâ versus apicem gemmulatâ. Long. 6, lat. 5, alt. 1 millim. Hab. Kagosima. W. S.

SCUTELLINA SCOBINATA. T. parva, cinnamomea, rotundato-ovata, admodum elevata fornicata, apice terminali, deflecto; extus undulis concentricis et striis confertissimis radiantibus ornata et granulis elongatis obliquis inordinatis scobinata; intus subnacrea. Long. 8, lat. 7, alt. 4 millim. Hab. Ousima. W. S.

EMARGINULA PILEATA. T. minuta, straminea, oblique ovato-conica, costis granulosis numerosis radiantibus ornata; apice anticali, obtuso; apertura ovato-rotundata; margine crenulato; fissura profunda retrorsum in canalem externum clathratum protracta. Long. 5, lat. et alt. 4 millim. Hab. Loo Choo. W. S.

EMARGINULA (Clypidina) ALTILIS. T. parva, obliquè conica, elevata, sulcis confertis radiantibus et liris tenuibus concentricis insculpta; apice obtuso, recurvo; apertura ovalis; margine crenulato; fissura profunda retrorsum in canalem externum reducta. Long. 5, lat. 4, alt. 4 millim. Hab. Kagosima Bay, 10 fathoms, gravelly. W. S.

More simply and finely striate than any other species.

E. (Clypidina) RADIATA. T. cinerea, elliptica, costis radiantibus imbricatulis ad 17 et costulis intermedianis ad 3 ornata, propè apicem acutum deflectum submedianum clathrata; intus viridi radiata, margine denticulato; fissura curta in canalem internum versus apicem producta. Long. 12, lat. 8, alt. 7 millim. Inhabits Sydney Harbor. W. S.

E. (Clypidina) TEXTILIS. T. parvula, tenuis, fusco et cinereo variegata, ovato-rotundata, costulis concinnè imbricatis (tertio vel quarto plerumque majore) radiata; apice subcentrali acuto; intus viridi vel zonata vel radiata, margine crenulato; fissura satis profunda posticè in canalem internum ad apicem producta. Long. 9, lat. 7, alt. 4 millim. Hab. Ousima, on surf-washed rocks. W. S.

RIMULA ECHINATA. T. parva, ovalis, costata, costis inequalibus echinatis, interstitiis simplicibus (?), apice acuto revoluto; foramine oblongo anticè rotundato, posticè in canalem clathratam reducto; margine indentato. Long. 9, lat. 7, alt. 4 millim. Hab.: Gaspé Straits.

An imperfect description from the figure of a shell unfortunately lost or missing. It seems different from the three recent species already described, but possibly may be *R. propinqua* A. Ad.

CHITON (Lophyrus) LUGUBRIS. T. parva, solida, punctata, elongato-ovata, vix carinata, smaragdina; areâ centrali liris longitud. pectinatâ ad apicem lævi; areis lateral. elevatis, liris ramosis nodulosis instructis; valvis terminalibus magnis propè marginem radiatis, umbone subcentrali; ligamentum latum, squamis magnis transversis convexis obtectum. Long. 25, lat. 15 millim. Hab.

C. (Leptochiton) COMPTUS. T. parvula, tenuis, elliptica, aut viridis aut incarnata sæpè albido vel flavo variè fasciata punctata vel maculata; valvis brevibus, terminalibus radiatim costatis etiam punctatis, areâ centrali quincuncialiter punctatâ; areis lateralibus elevatis et sulcis radiantibus 4–5 insculptis; intus viridans; ligamentum angustum squamis parvis elongatis sulcatis imbricatum. Long. 15, lat. 10 millim. Hab. Ousima, Bonin and Loo Choo Is. W. S.

In form like *squamulosus* and *rugulatus*, but sculptured differently; possibly *C. caliginosus* Rv.

C. (Leptochiton) JACOBÆUS. T. parvula, cinerea, elongata, elliptica vix carinata; valvis terminalibus permagnis, fornicatis, costis scabris radiantibus ad 10 ornatis; areâ centrali cancellatâ; areis lateral. conspicuis, bicostatis; ligamentum angustum, squamis minutis elongatis obtectum. Long. 12, lat. 5 millim. Hab. Simoda. W. S.

The vaulting and ribs of the two large terminal valves make them resemble two small Pectens.

C. (Leptochiton) CONCINNUS. T. minuta, rubida, elliptica, fornicata, omninò punctata, punctis seriatim dispositis, seriebus radiatim flectantibus; areis lateralibus haud elevatis, longitud. undulatis; valva antica crescentica; v. postica acutè umbonata concentricè undulata; ligamentum angustum, lutescens, pruinosum. Long. 8, lat. 5 millim. Hab. Hakodadi. W. S.

In size and form like *C. albus*, but sufficiently distinct by its evident lines of punctures.

C. (Leptochiton) CRATICULATUS. T. tenuis, fusco-cinerea, lata, elliptica, admodum carinata; areâ centrali longitud. clathratâ, clathris elevatis, acutis; areis lateral. angustis, elevatis, liris eminentibus asperis divaricantibus 4–8 instructis; valvâ anticâ crescenticâ radiatim liratâ; v. posticâ vix umbonatâ radiatâ; ligamentum latum, squamis minutis elongatis striatis vestitum, fusco-fasciatum. Long. 30. lat. 20 millim. Hab. China Seas, probably Simoda.

The number of ridges on the lateral areas and terminal valves varies much.

C. (Lepidopleura) LEPIDUS. T. parva, elliptica, tectiformis, flavo-virens olivaceo strigata; valva antica semicircularis, radiatim striata; v. postica crescentica, umbonata, radiata, anticè longitud. sulcata; areis lateral. elevatis, sulcis radiantibus ad 6 insculptis; areâ centrali imbricatim sulcatâ; ligamentum angustum olivaceo fasciatum, squamis minutissimis vestitum. Long. 13, lat. 9 millim. Hab. China Sea, lat. 24° N. W. S.

This deeply sculptured little species resembles generally *C. Siculus.*

C. (Chætopleura) PLUMOSUS. T. fusco-cinerea, ovata, valvis concavis vix umbonatis; valvâ anticâ liris radiantibus plumosis ornatâ; v. posticâ parvâ, umbone marginali et costâ submarginali utrinque notatâ; areâ centrali magnâ striis divaricantibus et striis lateralibus plumosè coadunatis ornatâ; areis lateral. parvis, costâ marginali finitis, striis denticulatis, interspatiis clathratis. Ligamentum latum coriaceum, tubulis (setigeris?) instructum. Long. 1.5, lat. .75 poll. Hab.

Allied to *C. cœlatus* Rv., which is said to be highly ornamented with green and pink. *C. Collei* and *C. muscosus* G. belong to the same group.

C. (Acanthochætes) ACHATES. T. angusta, elliptica, deluta, fuliginosa, strigâ flavâ utrinque ornata, valvis scutiformibus rostratis et carinatis, apicibus ebeninis glabris, alibi squamatim granulata; valvâ anticâ semiovali; v. posticâ parvâ, trigonâ, umbone subterminali; intus glauca. Ligamentum latum spinis curtis inequalibus et fasciculis spicularum munitum. Long. 30, lat. 20 millim. Hab. Kikaia and Hakodadi Bay. W. S.

C. (Moipalia) STIMPSONI. T. tenuis, rotundato-ovata, depressa, fastigiata, fusca, rufo, rosaceo viridi et flavo marmorata vel lineata, concentricè striata; valvis angustis planatis; areis lineâ elevatâ finitis; valvâ anticâ parvulâ, crescenticâ; v. posticâ minimâ, emarginatâ. Ligamentum coriaceum anticè valdè dilatatum, pilis fimbriatum. Long. 1.5 poll., lat. 1 poll. Hab. Hakodadi Bay. W. S.

Related to *C. Blainvillei,* but smaller, has no perceptible radiating lines on the anterior valve, and is not so vividly colored.

DENTALIUM ACICULUM. T. modica, tenuis, levis, nitida, lactea, admodum arcuata, propè apicem longitudinaliter sulcata, alibi undulis annulatis interdum obliquis ornata. Apertura circularis. Long. 30, diam. 3 millim. Hab. Coast of China, 23° 50′ N. in sand 25 fathoms. W. S.

Dentalium hexagonum. T. elongata, attenuata, ossea, arcuata, hexagona, angulis obtusis, lateraliter compressis, interspatiis inornatis; peristomate sexangulari. Long. 55, diam. 4 millim. Hab. Hong Kong, in shelly mud.

Dentalium buccinulum. T. modica, lactea propè apicem rubiginosa, admodum arcuatum, longitudinaliter sulcis ad 30 arata, versus aperturam evanescentibus, ubi lucida. Long. 30 mill. diam. 3 millim. Hab. Kagosima. W. S.

Most nearly allied to *D. curtum*, but is more deeply grooved.

Dentalium intercalatum. T. parva, albida, acuta, rapidè ampliata, ad apicem sulcis primum sex deinde 12 æqualibus longitudinalibus sulcata. Long. 18, diam. 2+ millim. Hab. China Seas. W. S.

Dentalium strigatum. T. benè arcuata, albido-rubescens, sulcis amplis concavis longitudinaliter striatis ad 13 insculpta, dissepimentis angustis, obtusis. Long. 18, diam. 3 millim. Hab. False Bay, C. Good Hope. W. S.

Dentalium porcatum. T. modica, cretacea ad apicem plus minusve rubiginosa, benè arcuata, sulcis tenuibus longitud. 12 sensim ad 20 auctis arata. Axis 20, diam. 2.5 millim. Hab. Hong Kong Harbor. W. S.

Dentalium clavatum. T. parva, clavata, polita, tenuis ferè hyalina admodum arcuata lateribus obliquè undulatis, versus aperturam valdè contracta. Long. 10, diam. 2 millim. Hab. Hong Kong; not uncommon. W. S.

This would be regarded as a Ditrupa had not Mr. Stimpson given a figure of the animal, which he assures us is a mollusk. It resembles *D. coarctatum* Desh.

Prof. Agassiz made a communication on reversed bivalve shells, and exhibited a specimen in the *Unio ligamentinus*, (Lamarck.)

In this genus, on the right side in the normal shell there is one cardinal tooth and one long laminar tooth, and on the left two cardinal and two laminar teeth. Reversion of bivalve shells is quite rare, and generally not easily observed except in those with unequal valves; and it is more common in gasteropods than in acephala.

Dr. Gould expressed the belief that the geographical distribution of unios would throw much light on generic distinctions, and that each large basin would be found to possess its peculiar animals.

Prof. Agassiz observed that this relation was especially observable in regard to fishes, though they have peculiar facilities for changing their locality. He instanced the Rhine, Rhone, and Danube, which in their head waters in Switzerland contained the same fishes; while lower down, the fishes of each river are not only different from each other, but those of the lower portion are different from those in the upper.

A specimen of the *Odontaspis griseus*, described by Mr. Ayres as *Carcharias griseus*, was presented by Dr. D. H. Storer.

This is a rare shark on our coast; the specimen, a female, was about four feet long. On each side of the teeth at the base was a small toothlet, and the upper lobe of the tail was much longer than the lower, and indented on the lower edge near the tip, differing in this respect from *Oxyrhina*, (Ag.) in which the upper lobe is but little longer than the lower.

Prof. Wyman gave an account of some observations on the shedding of the antlers of the American red deer.

After the rutting season is past, and, in consequence of the stoppage of the circulatiou through them, they have become dry and dead, the antlers are separated from the living frontal bone by a process of absorption carried on by the Haversian canals. These acting on one plane through the whole thickness of the bone just below the "burr," remove the solid materials around them, so that each canal becomes dilated on that plane until its cavity unites with that of an adjoining one. When this process has extended entirely across the base, the antler drops. The fall of the antler was shown to have a close resemblance to the process by which, in necrosis, the dead is separated from the living bone.

He also was disposed to regard the antler as a dermal bone, rather than a portion of the endo-skeleton; 1st, because it is developed in the integuments by a special centre of ossification, and only becomes attached to the frontal bone after ossification has somewhat advanced; 2d, because the permanent antlers of the Giraffe do not become united with the cranium except by suture until late in life, and are developed over the parietal as well as the frontal bones, without being divided on the line of the sutures of these two bones, which they would be were they merely epiphyses of them.

November 2, 1859.

The President in the Chair.

Prof. William B. Rogers exhibited a fossil cast in sandstone of part of the trunk of a large Sigillaria, from the South Joggins in Nova Scotia, where, as first shown by Logan and Dawson, these and other stems belonging to the carboniferous age occur at numerous levels in the strata, and are to be seen standing in the erect position in which they grew.

In considering the process by which these stems were originally enveloped by the mass of sediment now inclosing them in the shape of sandstone and shale, an inquiry of much interest is suggested *as to the rate of accumulation of the deposit in which they are buried.* Many of these erect trunks are of very considerable height, and one is mentioned by Sir Charles Lyell as traceable vertically across the strata for a distance of twenty-five feet. In all such cases the decay of the tree could have made no great progress before the trunk became buried to the whole observed depth, otherwise it would have become too weak to maintain an erect position, and must have fallen over. We infer, therefore, that the mass of sediment even to the height of twenty-five feet, in the case above cited, must have been accumulated around the stem in a period extending at farthest only to the earlier stages of change in the organic structure. Moreover this conclusion is strongly confirmed by the fact, that the peculiar markings of the outer wood, and even of the bark, are often found impressed so distinctly on these erect sandstone casts as to afford a means of discriminating the character of the plant.

It seems therefore undeniable, that in these cases the mass of sediment, amounting sometimes to twenty-five feet, was accumulated around the standing tree in a very short time, a mere moment as compared with the units according to which geologists are accustomed to reckon the growth of such deposits, in the usual way of sedimentary accumulation. Yet a little consideration will show, that facts of this kind furnish no support to the opinion of those whose imperfect acquaintance with geological data have led them to deny the necessity of prolonged cycles of formative action in the production of the great systems of sedimentary strata.

In explaining the rapid entombment of the trees in their vertical position, it should be borne in mind that there are two processes very distinct from each other by which sediment may be accumulated over a given area. One of these is the series of actions by which the materials of preëxisting rocks, worn down, and diffused by tides and currents, are deposited more or less equally over wide regions, so as to build up step by step a newer system of formations. The other consists in the transfer of sediment already accumulated, from one part of the bed of the sea or estuary to a neighboring one. In the former process it would seem clear, from all the geological data, that vast periods of time must have been consumed. The latter being nothing more than the sweeping of soft sand and mud from one submerged area to another in its vicinity, would require no other agency than some unusual local disturbance of the waters, such as might result from earthquakes or great inundations, and would demand but a short time for its completion. In this view, the thick mass of sandstone and shale inclosing the erect trunk of the fossil tree, although accumulated at this particular part of the carboniferous area in a very short time, is not to be regarded as simply the product and measure of this brief geological moment. Considered in relation to its previous history in the carboniferous period, it rather represents the comparatively long series of combined actions which brought its materials into suspension in the waters, and gradually deposited them over the area, from which they were afterward so rapidly removed.

In framing any conjecture as to the length of time corresponding to the formation of a group of strata at any particular locality, as the Joggins, we would of course ascribe but a small value in years to such masses of deposit as thus prove themselves to have been hastily accumulated at the spot where they are found. But on the other hand we should be careful not to apply the same measure of rapid accretion to those associated beds of shale, limestone, coal, and even sandstone, which give intrinsic evidence of having been tranquilly and slowly deposited. We should also keep in view the important fact, that while one part of the column of strata whose chronology we are studying has been thus rapidly built up, by the materials swept into it from a neighboring quarter, other parts of the same column have been reduced in thickness, or even wholly removed, by similar local actions in the opposite direction ; and *that therefore the strata as they stand give us the measure of a time much less than that in which, as a group, they were actually deposited.*

Prof. Rogers next proceeded to compare the Lower Carboniferous rocks of Nova Scotia and New Brunswick, which he had lately in part examined, with certain groups of strata holding a corresponding geological position in the Appalachian belt of the United States.

Early in the geological surveys of Virginia and Pennsylvania, it was found that two groups of strata of great thickness were interposed between the series of arenaceous red rocks forming the top of the Devonian and those massive conglomerates and sandstones which usually mark the base of the true coal measures.

Of these intervening masses, the *Lower Group*, consisting of conglomerates, sandstones, and sandy slates, and shales, usually of a brownish and greenish gray color, abounds in impressions of Lepidodendra and other terrestrial plants allied to those of the true coal measures, although not in general identical with them, and includes in some of its outcrops one or more considerable seams of coal.

The *Upper Group*, exposed along the northeastern margin of the coal region of Pennsylvania, consists of a great thickness of red shales and sandstones, passing upward into buff argillaceous sandstones, and including at some points a few calcareous layers, with now and then the impression of a mollusk. In its extension toward the southwest it becomes rapidly more and more calcareous, until in the valley of the New River in Virginia we find it embracing a limestone formation upward of fifteen hundred feet in thickness, most of which is crowded with carboniferous fossils. In this district, and as traced further toward the southwest, this upper group presents in the ascending order the following succession of mineral masses.

First — Argillaceous red and green shales becoming more calcareous, and in the same proportion more fossiliferous, toward its upper limit.

Second — The great mass of limestone above referred to, consisting of an alternation of compact and often oölitic strata with more argillaceous beds weathering into calcareous shale, and containing throughout a great abundance and variety of carboniferous fossils.

Third — Red and variegated shales, with thin strata of limestone containing similar fossils ; and

Fourth—Alternations of red sandstone and red shale with brown, buff, and gray sandstones, the latter varieties predominating toward the top of the series. To this succeeds the conglomerate and other coarse sediment forming the floor of the true coal measures.

The *lower* part of this group, in its most southern outcrop in Virginia, includes *a great thickness of gypsum*, while the gray and brownish sandstones abounding in the upper portion are often impressed with vegetable remains, and in some instances contain plates, and even thin seams of coal.

The distinctive features of these two great groups of strata, as well in organic contents and lithological character as in their influence upon the topography of the regions in which they occur, early led the State geologists of Pennsylvania and Virginia to regard them as separate divisions of the carboniferous system, and to designate them severally by the numbers X. and XI. in the numerical classification of their surveys; titles which, without altering the assigned limits of the two groups, they have replaced in their later nomenclature by the terms Vespertine and Umbral series. More than twenty years ago they made known the existence and geological position of these formations through the descriptions and tracings of the Virginia and Pennsylvania Reports, and they have since always assigned them a prominent place when treating of the order and character of our paleozoic rocks. The carboniferous relations of the lower or Vespertine group, taken in connection with its depth beneath the true coal measures, were early recognized as a feature of peculiar geological interest, and in 1849 Prof. Rogers had made it the subject of a special communication to the British Association, on which occasion he called the attention of British geologists to the existence in the United States of this group of plant-bearing strata, and even of coal measures, beneath several thousand feet of marine deposits, having the general characters of the great carboniferous limestone of Europe, and remarked upon the vast interval of formative actions which must have intervened between the production of these earliest carboniferous rocks and the true coal series. This slight reference to the history of the subject will show how early and by whom the two formations in question were first clearly recognized and introduced into a classification of the North American strata.

In the recent publications of Prof. Dawson on the carboniferous rocks of New Brunswick and Nova Scotia, so ably explored by himself, Sir Wm. Logan, and Prof. Robb, we find this geologist virtually recognizing a similar binary subdivision of the great series of deposits which form the lower carboniferous system of these regions, describing those which lie at the base of the series as the *lower coal measures*, or lower freshwater or estuarine deposits, and the remainder as the *lower carboniferous marine deposits.*

Combining the data collected by Prof. Dawson and others with his own observations during the past season, Prof. Rogers had become satisfied of the close parallelism of these two divisions of the carboniferous rocks of Nova Scotia and New Brunswick with the above described Vespertine and Umbral groups respectively, especially as the latter are developed in the valley of the New River, and the adjoining region toward the south. The sandstones and slates of the Gaspereau, and of Horton Bluffs and Half-way River, as well as other localities on the Bay of Mines, and the corresponding formation containing the asphaltic coal of New Brunswick, all underlying the gypsiferous marls and limestone, with carboniferous fossils of these regions, seem to be clearly referable to the same geological horizon with the great mass of plant and coal-bearing rocks comprised in the Vespertine series, which, as we have seen, lie immediately beneath the gypsiferous marls and carboniferous limestone of southwestern Virginia. The red marl and limestone of the gypsiferous group in Nova Scotia and New Brunswick, with those alternations of red and variegated shales and sandstones which are seen overlying them on so grand a scale in the section of the South Joggins, obviously occupy the same geological place as the analogous Umbral series of the Appalachian formations. In both regions we see the lower carbonaceous strata, the accumulation of extensive swamps and estuaries, succeeded by a vast series of marine formations, in the shape of red and variegated marls and shales and beds of limestone, thronged with remains characterizing the carboniferous period; and in both, as we approach the upper limit, we see alternations of shales and sandstones with plants and occasional films of coal, marking the fluctuating dawn of those physical conditions which were to culminate in the vast vegetable deposits of the coal measures.

Prof. Agassiz inquired what proof there was that the carboniferous series so-called is a single formation. As an instance of the manner in which the extension downward of a geological series had been made, he instanced the Jura, which twenty years ago was considered a single formation, but which is now divided into seven or nine distinct formations, each with its characteristic fossils.

Prof. Rogers replied that he used the term "carboniferous series" as a convenient expression for a group of formations of a certain geological period, without implying that it was a single formation; indeed, he and his brother had long since made a triple division of the series, giving to each division a separate name.

Prof. Wyman alluded to the idea of Prof. Lyell, that if the trees of this period were hollow, the remains of animals might occasionally be dropped in; and such remains were actually found and described by him a few years ago. Since then, Prof. Dawson had examined further, and had found remains of an articulate like *Julus*, and more bones of reptiles, viz: of eight individuals of *Dendrerpeton*, and three of *Hylerpeton*, a new genus of batrachian reptiles, with a new species of *Dendrerpeton*.

Dr. C. T. Jackson read a letter from Dr. Evans, of Oregon Territory, confirming his former opinion that the meteorite recently found in that Territory is identical with the Pallas meteorite of Siberia.

He also exhibited a specimen of the tin ore of Los Angelos, California.

Dr. J. Mason Warren exhibited the dissection of a young lioness, two months old.

November 16, 1859.

The President in the Chair.

Dr. White exhibited some living larvæ in water, said to have been vomited from the human stomach. They were very active, and belong to the genus *Corethra* of the family *Tipuladæ*. The person reported to have ejected them had been drinking water from a newly made well, from which the larvæ were drawn; they probably had never entered the human stomach, where they would have been soon destroyed. The following is a description of these larvæ :—

The length $\frac{3}{4}$ of an inch; head lozenge-shaped; upper jaw proboscis-like, and terminated by a double hook bent down at a right angle; lower jaw short, and composed of two small hooks directed upward toward base of proboscis. Eyes black and prominent; neck short, followed by a large globose segment furnished with two crescentic inclosed spiracles; six following segments cylindrical, globose, and tapering to the eighth, which is enlarged to hold a pair of spiracles corresponding to the first; two terminal joints long and tapering, the last furnished with a fan of bristles posteriorly and below.

Dr. White also presented, from Dr. Bowditch, a specimen of a hair worm (*Gordius*) said to have passed from the human body after the use of aloes, though it probably never was so passed. It does not answer to either of the two described by Dr. Leidy; he proposed for it the name of *G. trifurcatus*. The description is as follows:—

MALE. Length 5 inches; diameter $\frac{1}{3}$ line; shape uniformly cylindrical; head obtusely conical; posterior end divided into two long and narrow lobes, and one shorter and broader lobe, incurved and fringed with short thick hairs. At base of larger lobe is the genital opening, from which the spermatozoa are seen escaping with extremely long tails. Color uniformly light brown.

The President remarked that the children of Mendoza, at the foot of the Andes, not unfrequently have the nostrils infested by the larvæ of a fly; the affection is accompanied by a discharge at first mucous and afterward bloody, and sometimes proves fatal; the perfect insect resembles our blue-bottle fly, but is smaller. Similar instances have been observed on the Pacific coast of South America, and in Cayenne.

Prof. Wyman inquired if any of the members had seen any accounts of recent elephants having been swamped in large numbers. Rev. Mr. Walker, of the Gaboon Mission, informed him that such an instance had occurred in that vicinity, where many elephants had thus perished together in a mud hole. The fact is interesting, as showing at the present epoch causes of death similar to those which probably existed in the time of the mastodon, several of which were found together in New Jersey, supposed to have been mired in the same locality.

Dr. C. T. Jackson read some letters from Dr. Evans, concerning the meteorite discovered by him in Oregon Territory; the mass, about three feet of which was above ground, was in the mountains, about forty miles from Port Orford, on the Pacific, and easily accessible by mules. He hoped the Society, as a body or individually, would take speedy and proper measures to secure its deposition by government in the Smithsonian Institution.

Prof. W. B. Rogers made some remarks on the geology of the neighborhood of St. John, New Brunswick, and described, by the aid of a section, the stratigraphical features exhibited at the junction of the older and less ancient groups of strata on the St. John and Kennebecasis rivers, a few miles above the city, as observed by Prof. Robb and himself during the past summer. Here the steep-dipping slates and limestones of the older group may be seen suddenly giving place to nearly horizontal beds of reddish conglomerates, which abutting against them, and in part resting on their upturned edges, present a very striking example of unconformable contact.

Referring to the probable ages of the two groups, Prof. Rogers mentioned the fact that hitherto the only fossils discovered in the belt of metamorphic slates and limestones ranging along the northern side of the Bay of Fundy, and on which St. John was built, consisted of vegetable impressions of a rather vague kind found by Prof. Robb at several localities, and of which specimens may be seen in the olive slate of the hill near the cathedral. To these Prof. Rogers was now able to add a fossil which he hoped might prove more definite in its indications. In his explorations around the city he had found loose pieces of silicious slate, containing black scale-like *fragments of shells*, and had afterward discovered, at several points, the layers of rock, in place, crowded with these remains, the more entire of which presented the form and markings of a *Lingula*.

Mr. Charles H. Wing, of Boston, was elected a Resident Member.

December 7, 1859.

The President in the Chair.

Prof. Rogers presented the following communication on the meteor of August 11, 1859, by Mr. David A. Wells :

On the morning of the 11th of August, 1859, at 7 o'clock and 20 minutes or thereabouts, thermometer 73°, air still, and the sun shining brightly, a meteoric body of great size and brilliancy was observed throughout a large portion of Western New England and Eastern New York, which exploding violently threw down to the earth at least one fragment of its mass, in the vicinity of Albany, N. Y.

The main facts connected with this interesting phenomenon, collected from numerous and widely separated observers, are as follows:—

By observers generally, north of Albany, the meteor is described as appearing in the southeast, at an elevation of from 45° to 60°; thence it passed rapidly to the south, and disappeared a little west of south, at an elevation of from 10° to 15°. Its course, throughout its visible range, was marked by a heavy train or trail of smoke, which continued visible for some time after the meteor itself had disappeared; and at two or three points in its course, large volumes of smoke were observed to form, as if the result of successive explosions. These volumes of smoke were observed to be in a state of great agitation, and in size were compared to the cloud of smoke produced by the discharge of a six-pounder.

To observers, generally, south of Albany, (twenty miles or more distant,) the meteor was first seen in the northeast, and disappeared in the northwest; a fact which indicates the path of the body to have been nearly coincident with the parallel of Albany.

A few minutes after the disappearance of the meteor, the lapse of time being variously estimated, by differently located observers, at from thirty seconds to two minutes, two or three loud and successive explosions or reports were heard, accompanied by prolonged echoes and a violent concussion. These sounds have been compared by some to sharp and heavy peals of thunder, to the report attending the explosion of a powder mill, or steam boiler, and also to the rumbling of heavy carriages on a bridge. In Troy, the concussion and jarring were sufficiently intense to suggest the idea of an earthquake; people walking in the streets involuntarily stopped, and for a moment nearly every occupation was suspended. At Schaghticoke, N. Y., and Bennington, Vt., where powder mills are in operation, the report was referred to explosions at the works. At Eagle Bridge, on the Troy and Bennington Railroad, the concussion was forcible enough to jar the windows and shake the seats of a train of cars in motion. At Greenbush, opposite Albany, numbers of people rushed to the docks, under the supposition that a passing steamboat had exploded her boiler. The noise and concussion also appear to have been noticed, to nearly an equal extent, at points sixty miles east of the Hudson, while the whole area over which the sound is positively known to have been *heard* with distinctness was upward of two thousand square miles. The area of country, on the other hand, over which the meteor was *seen*, was, as might have been expected, much larger than the area over which the explosions were heard, being at least equal to six thousand square miles. Thus, observations were made upon it at Morristown, Lamoille Co., Vermont, twenty-five miles north of Montpelier, and at South Manchester, Conn., a point nearly two hundred miles south; it was also observed at localities west of the Hudson River, and at various points from thirty to fifty miles east of the Hudson. Within a radius of thirty miles northeast and southeast of the city of Troy, it was probably observed by every person out of doors, who was at the time looking in a southerly direction; yet such is the unreliability of human testimony as regards natural phenomena, that no two observers can be found to agree as to many important particulars, such as apparent size, period of visibility, direction, altitude, &c.

The estimates formed of its size are exceedingly discrepant; some observers comparing it to the sun, or full moon, and others to a sky rocket, or the luminous ball projected from a Roman candle. All agree, however, that its appearance even in full sunshine was exceeding bright and dazzling, the light being at the same time of a reddish color. So bright, indeed, was it at Strafford, Vt., a locality nearly one hundred miles north of the probable point of explosion, that its distance was estimated as not exceeding a half a mile from the point of observation.

A single fragment only of the meteor is positively known to have fallen. This was found in Bethlehem, Albany Co., N. Y., and at a point about ten miles west of Albany. The circumstances connected with the phenomenon related by the person who noticed it are as follows: —

While standing in the inclosure adjoining his house, his attention and that of his family was attracted by a loud sound, over head, which somewhat resembled thunder; and a few minutes after a stone struck the southeast side of a wagon-house, and bounding off, rolled into the grass. A dog lying in the doorway started up and ran to the place where the stone fell. When picked up immediately after, it was found to be quite warm, and possessed of considerable sulphurous odor. The fragment in question was small, about the size of a pigeon's egg, and irregularly shaped. Nearly three fourths of its superficies was covered with a black, non-lustrous, evidently fused crust, while the remainder presented the appearance of a fresh fracture, and was of a light-gray color, and of a granular or semi-crystalline texture. Its composition was apparently silicious and not metallic. This specimen was bought by the Regents of the University of the State of New York, and is now deposited in the State Cabinet at Albany. Other fragments are reported to have fallen in the vicinity of the Hudson, but careful inquiry has thus far failed to discover them.

From the above facts it seems evident, that the meteor of August 11th was of immense size, probably of tons weight, and that it exploded violently at no great distance above the surface of the earth. It is also an interesting subject of speculation as to what became of the other fragments; and also of what the smoke so abundantly developed during its course was composed.

The Curator of Entomology read the following posthumous paper by the late Dr. T. W. Harris: —

OBSERVATIONS ON THE TRANSFORMATIONS OF THE CECIDOMYIÆ. BY T. W. HARRIS, OF CAMBRIDGE, MASS.

The following are understood to be established doctrines concerning the transformations of insects:—

During the growth of an insect, new membranes or skins are successively formed or matured beneath the outer skin, whether the latter be immediately cast off or temporarily retained. The innermost or last-formed membrane becomes the skin of the *imago;* the penultimate is the skin of the *pupa;* and the antepenultimate is the skin of the *larva.* The *Ephemeræ* moult their skins once, after taking the imago form. Moreover, many larvæ cast their skins repeatedly before assuming the pupa state. Some, however, do not moult the larva-skin till they are about to become pupæ. Other insects, during the pupa state, retain the loosened larva-skin, and this forms a case or kind of cocoon for the included pupa. Dipterous insects are said either to cast off the larva-skin once only, that is, when they disclose the pupa, or, to retain it for a case to the pupa, which hence is called a *coarctate pupa*.

The writer does not recollect that any exceptions to the foregoing statements have hitherto been recorded by European entomologists. The transformations of the *Cecidomyiæ*, as observed by American naturalists, offer certain peculiarities or remarkable exceptions, which are now to be described. There are three modifications in the transformations that these insects undergo, represented respectively by *Cecidomyia salicis*, (Fitch), *C. tritici*, (Kirby), and *C. destructor*, (Say).

Cecidomyia salicis is an American species, inhabiting willow galls. Being of large size, it is an excellent object for the observation of the anomalous transformation that is common to it and to other species of the genus. The gall, produced by this insect, consists of a woody tumor, surmounted by the dry and brittle terminal bud, at the tips of the twigs of *Salix rigida* and *Salix lucida*. It contains only a single larva, which perforates the gall from the tip to the bottom, and, when fully grown, lines a portion of the cavity with a delicate silken web. During the winter, the larva remains unchanged, and in a dormant state, within its cell. The change to the pupa state occurs in the following spring, and is effected without any moulting of the larva-skin. Dr. Asa Fitch, the describer of the species, first called my attention to this fact, which has been confirmed also by my own observations. The approaching change is marked by an alteration of the color of the anterior segments of the larva, which, from orange, become red and shining, as if distended with blood. Soon afterward, rudimentary legs, wings, and antennæ begin, as it were, to bud and put forth, and rapidly grow to their full pupal dimensions ; and thus the transformation to the pupa is completed. When the fly is about to be disclosed, the pupa bursts through the silken lining of the upper part of its cell, and works its way to the external opening in the top of the gall, where it is retained while the fly disengages itself from the pupa-skin. The peculiarity of this kind of transformation consists in the fact, that the conversion to the pupa is effected without any moulting of the larva-skin, which is retained in a modified form, and becomes the proper skin of the pupa.

The American wheat-fly appears to be identical with the European *Cecidomyia tritici.* When the orange-colored larva of this species is fully grown, its body contracts and becomes loosened from the outer skin, which is so thin and delicate that the included larva may be seen through it. In this condition the larva remains quiescent several days, after which it extricates itself from its filmy skin, and recovers its activity, but takes no more food. The wheat-ears are often found full of these delicate cast skins, which are so light as to be wafted away by every breeze. Sometimes, though rarely, this moulting does not occur till after the larvæ have left the grain. Their descent is generally made in the night, and is facilitated by the heavy dews or falling rain. Having moulted and descended to the ground, the larva buries itself just below the surface, and there remains in a dormant state, and without change, till the following spring. A few days, at most, before its final transformation, this larva becomes a pupa. The manner in which this transition is effected is altogether similar to that which has been observed in *C. salicis.* The abdominal portion of the larva-skin undergoes little or no change; the forepart of the body becomes red, swollen, shining, and apparently gelatinous, and allows the budding limbs and wings to push outward, so that each member becomes enveloped in its own process of the yielding cuticle. The pupa then, though covered still with the larva-skin, which is merely modified by extension or growth, or both, to suit the changed condition of the insect, is not a true coarctate pupa; it is a naked pupa, with its limbs and wings exposed and free, and folded upon the breast. The insect continues in the pupa state only a very few days; it then makes its way to the surface of the ground, casts off its modified larva or pupa skin, and appears in the winged form. This is the only Dipterous insect which is known to cast off and abandon its skin while in the larva state. Other species of *Cecidomyia*, however, may be found to exhibit the same peculiarity.

The Hessian fly, or *Cecidomyia destructor*, (Say) is another European species, which has become naturalized in the United States, having been introduced seventy-five years ago. It furnishes an example of a third kind of transformation, but little, if at all, understood by European entomologists. The larva of this insect, when it has come to its growth, remains fixed and motionless on the culm of the wheat. Its body contracts, and soon takes the form and color of a flaxseed. While this change is going on externally, the body of the insect gradually cleaves from its outer dry and brownish skin. When this is carefully opened, the included insect will be seen to be still in the larva state. Mr. Westwood found it in this condition in a specimen sent to him from Vienna; and hence came to the erroneous conclusion that the European species was not the same as the American Hessian fly. But the fact is well established, that the American insect retains the larva form, for some time, within its external or penultimate flaxseed skin. It does not change its condition, indeed, until a few days before it discloses the winged insect. It does not appear to moult its last larva-skin, in order to become a pupa; for on careful examination, not the least vestige of a cast skin has been found within the flaxseed shell. The transition from the larva to the pupa state is effected in the same way as in the foregoing examples, by the softening of the anterior segments of the larva, to admit of the development of the limbs and wings of the pupa. The insect, in this stage, may be said to be *a coarctate pupa*, being inclosed within a brownish leathery skin or *puparium*, which, however, as before stated, consists, not of the last, but of the penultimate larva-skin. In due time, the pupa breaks open and crawls entirely out of its *puparium*, and resting between the leaf and the culm, its delicate skin is rent on the back, and the perfect fly extricates itself therefrom. In this example (and it seems not to be the only one in the genus,) two anomalies occur in the metamorphosis: first, the penultimate larva-skin becomes the *puparium*; and, secondly, the last larva-skin is only modified anteriorly, without being cast off, when the insect is changed to a pupa. It should be noted also, that in all these cases the pupa becomes active shortly before its final change.

The characteristics of the three varieties of transformations described in this communication may be thus briefly summed up.

1. Larva inclosed in a gall and in an imperfect silken cocoon, and passing to the pupa state without moulting its skin.

2. Larva exposed, and not inclosed in a cocoon; casting off its penultimate larva-skin; and becoming a naked pupa in the ground without moulting its last skin.

3. Larva (and pupa) remaining inclosed in the penultimate larva-skin; and becoming a coarctate pupa without casting off its last larva-skin.

For the specific characters of these and of some other species of *Cecidomyia*, illustrated by figures, the elaborate descriptions by Dr. Asa Fitch may be consulted.

Dr. B. J. Jeffries alluded to experiments which had been made by Dr. Mitchell at Philadelphia, and exhibited the results of similar ones of his own, in injecting strong solutions of sugar under the skin of frogs; if the animals be kept from water they die in a few hours, but if kept in water they recover, with, however, the production of a cataract in both eyes; the cataract being confined to the superficial posterior layers, the interior of the lens remaining clear.

Dr. Williams remarked that the cataract thus produced disappears in course of time; this is an interesting fact, as this condition in man never disappears unless the capsule of the lens be ruptured either spontaneously or by art. He had noticed cataract in persons affected with diabetes.

Mr. Stodder exhibited the tooth of a large sperm whale, with an abnormal nodular growth of *cementum* in the interior and about the base of the tooth.

Dr. C. T. Jackson presented, in the name of Jules Marcou, a pamphlet on the "Dyas and Trias," in which that author states that the Roxbury conglomerate belongs to the period of the new red sandstone, — an opinion from which Dr. Jackson entirely dissented, maintaining that it underlies the coal.

Mr. Bouvé remarked that he had been able to trace the gradual change from the conglomerate into a compact, homogeneous, almost jaspery rock, the latter being very striking in Hingham.

Mr. Theodore Lyman mentioned as an instance of the neglect of the study of the descriptions of our early zoölogists, the case of the *Ophiura appressa* (Say), which by way of exclusion he had determined to be the same as that recently called *Ophioderma virescens* (Lutken); the last agrees perfectly well with Say's description, is abundant in Florida, and differs from all other known Florida or West Indian species.

Mr. Stodder reported on the microscope slides presented by Mr. Samuels, Oct. 5, and referred to him for examination.

The specimens he found to be very interesting, and some of them new; especially the diatoms from the intestines of holothurians and echini — collected for Prof. Agassiz and Mr. J. M. Barnard. Many species have been ascertained to be common to the Sandwich Islands and the Mediterranean; some are common to England, Nova Scotia, Boston Bay, and the Sandwich Islands; others are common to the Sandwich Islands, Zanzibar, and Florida, — in fact, diatoms have long been known as the most cosmopolitan of organisms.

The new species, recognized as such, by Mr. A. M. Edwards, of New York, are *Synedra magna*, *S. Pacifica*, *Triceratium circulare* (with three and four sides), *T. elegans* (with three and four sides), and *T. undatum* (with three, four, and five sides). These variations raise the question again, whether there is any distinction between *Triceratium* and *Amphitetras;* several four-sided species are described by Mr. Brightwell, and the only difference between *T. Wilkesii* and *A. Wilkesii* (Harvey & Bailey) is the number of sides. Among the rare and recently described forms are *T. dubium* (Bright.), *Cocconeis fimbriata* (Bright.), and *Biddulphia reticulata* (Roper). *Campelodiscus striatus* (Ehr.), figured by Brightwell in the Journal of the Microscopical Society, is abundant, but he is satisfied that it is distinct from Ehrenberg's species, answering neither to the description nor the original figure of that species; he proposes to call it *C. Brightwellii*. *Synedra undulata* (Greg.) = *Toxarium undulans* (Bailey), and *S. Hennedyana* (Greg.), and *Naviculæ*, are abundant. *Navicula didyma* and *N. lyra* are abundant, showing great variations within the probable limits of each species. There are two forms of Ehrenberg's genus *Actinocyclus*, called by most English writers *Eupodiscus; Stauroptera aspera* (Ehr.) = *Stauroneis pulchella* (W. S.) is abundant and variable; in the Zanzibar slides he had seen an *Auliscus* which may be new, and an *Isthmia* certainly new, with many forms common also to the Sandwich Islands. Mr. Edwards has undertaken to describe and figure the new species, for publication in the Journal of the Society.

The Corresponding Secretary read the following letters, viz: —

From Dr. A. Snowden Piggot, of Baltimore, and William Sharswood, Esq., of Philadelphia, accepting Corresponding Membership; from the Royal Geographical Society of London, the Société des Sciences Naturelles de Neuchatel, the Royal Society of Sciences of Göttingen, and the Natural History Society at Bonn, acknowledging reception of parts of Vols. 5 and 6 of the Proceedings of the Society, and No. 4 of Vol. 6 of the Journal; from the Royal Academy of Sciences at Berlin, and the Zoölogico-Botanical Society at Vienna, acknowledging the same, and presenting their publications; and from the Natural History Society of Emden, sending their Proceedings for 1858.

Prof. J. L. Riddell, M. D., of the University of Louisiana, and J. B. Avequin, M. D., of New Orleans, were elected Corresponding Members.

Messrs. N. S. Shaler and Burt G. Wilder of Cambridge, and W. E. Sheldon of West Newton, were chosen Resident Members.

December 21, 1859.

Dr. C. T. Jackson, Vice-President, in the Chair.

Mr. Scudder read a paper by the late Dr. T. W. Harris, on *Cicindela Hentzii*: —

This insect was first described, under the name of *Cicindela hæmorrhoidalis*, by Professor N. M. Hentz, in a paper read before the American Philosophical Society of Philadelphia, on the 2d of November, 1827, and published in 1828, with a figure, in the third volume of the Transactions of the Society. It appears, however, that the same name had been previously given to another species, described, in 1823, in the second volume of Wiedemann's Magazin, and therefore Count Dejean rejected the name adopted by Professor Hentz ; but in substituting another, in his catalogue, and in the fifth volume of his " Species Générales des Coléoptères," he gave it the unfortunate misnomer of *Cicindela Hentzii*. Count Dejean's description of it was drawn from a single male specimen, which he says " was sent to him by M. Leconte, who had received it of M. Hentz." The latter part of this statement contains two errors. Dejean's specimen was sent to him by Major Leconte, who received it from me as the *Cicindela hæmorrhoidalis* of Professor Hentz. The latter gentleman was well known, at least by name, to Major Leconte, who therefore can hardly be held accountable for the misnomer.

Having been the first discoverer of this rare and pretty insect, I now propose to give an account of the times and places where it has been found, and to make some observations on its habits and specific characters.

Hitherto it has been met with only on the sides and top of the Blue Hills, in Milton, Massachusetts. My first specimen was taken, on the 20th of August, 1824, in a stony path, near one of the ledges of sienite, forming a part of the Blue Hill range, and about three miles and a half in a northeasterly direction from the principal summit. As the insect rose and flew in the path before me, its red-colored abdomen was exposed, and led me at once to notice and distinguish it from the *Cicindela punctulata*, then common in other places. On dismounting from my horse, I succeeded in catching the insect by throwing my handkerchief upon it. Other specimens were sought for in vain in the same place, then and afterward. It was not till the 20th of August, 1826, that two more were taken, basking on a large flat rock, in a path leading to another part of the same range, and about one mile and a half from the top of Blue Hill. In capturing them, a rattlesnake, coiled up and concealed in a bush near the edge of the rock, was disturbed, and one of the insects was taken within a foot of the reptile's head, just as the warning rattle was given. One of these specimens I gave to Professor Hentz to be described, and at the same time suggested the name that he adopted for it. All the rest of my specimens were taken on the top of Blue Hill, at an elevation of 710 feet above the level of the sea, and at the following times, namely, August 15, 1827; August 5 to 15, 1831; August 10, 1833; September 2, 1836; July 26, 1838; and lastly August 26, 1848, twenty-four years after the first discovery of the species. Most of all the known specimens have been captured and distributed by me. A few have been taken in the same place, by some of my entomological friends; but none have been found elsewhere to my knowledge.

Cicindela Hentzii is not plentiful, even in the places inhabited by it. It resorts chiefly to the large flat rocks, that rise but little above the surface of the soil. These rocks are thinly encrusted with lichens, intermingled with a few tufts of the long-leaved *Houstonia*, and are edged with patches of the trailing Bear-berry, and with low shrubs and scanty herbage. While resting, this Cicindela is hardly to be perceived, so well does it harmonize in hue with the lichen-covered rocks; but when it rises on the wing, it is betrayed by its motions, and by the red color of the abdomen then exposed to view, and appearing as if tinged with a drop of blood. Not unfrequently, on alighting, it begins apparently to browse on the lichens. Probably it finds there some minute insects, spiders, or acari, that serve for its food.

The rarity and limited range of *C. Hentzii* have led to the suspicion that it might be a local variety of some other species, perhaps of *C. rufiventris*. The latter, though stated by Dejean, on the authority of Palisot de Beauvais, to be a native of St. Domingo, is found in the Southern States. My specimens of the *rufiventris* were taken in North Carolina. There is no other known North American species that comes so near *Cicindela Hentzii* as this. They agree nearly in size, in the color of the abdomen, and in the number and arrangement of the white spots on the wing-covers. So too, *Cicindela repanda* and *duodecim-guttata*, which are now accounted distinct and genuine species, closely resemble each other; indeed, they are more alike than *C. Hentzii* and *rufiventris;* and they were regarded by Mr. Say, though doubtless incorrectly, as mere varieties of his *C. hirticollis.* If one of these insects in question is to be taken for a genuine species, and the other for a variety, *C. Hentzii* should be selected for the type, having all the elytral spots complete and distinct; and *C. rufiventris* for a variety, with these spots nearly effaced. If this view of the case be correct, we should expect to find, what have never yet occurred, specimens intermediate between the typical species and the variety, having the elytral spots larger and more distinct than in *C. rufiventris*, but not so fully developed as in *C. Hentzii.* From a careful comparison of many specimens of *C. Hentzii* and *C. rufiventris* together, I am inclined to think that both are genuine species. Independently of their different colors, and of the size and form of the elytral spots, they present other distinctive specific characters. The thorax of *C. Hentzii* is more nearly quadrate, and is almost straight at the sides; that of *C. rufiventris* is more contracted before and behind, and is rounded at the sides. The common punctures on the wing-covers of the latter are much larger and more distinct than those of *C. Hentzii*, while the subsutural row of ocellated punctures, which is visible even to the naked eye on each wing-cover of *C. Hentzii*, is obsolete or entirely wanting in *C. rufiventris.*

If diligently sought for, in the right season of the year, *Cicindela Hentzii* may yet be found in other parts of the United States, and especially on those hills of New England, where the rocks appear in flat tabular masses above the surface of the soil. Its discovery in these or other places would be interesting, and worthy of being made known through some scientific journal.

The color of the upper side of this insect is a very dark or obscure bronzed brown. The upper lip is whitish, with one small tooth on the edge. Each wing-cover is marked with yellowish white spots in the following manner: on the shoulder and on the tip a C-shaped spot with dilated extremities, the first often interrupted on the margin; across the middle an S-shaped band, consisting of two crescents joined by their reversed tips; on the margin behind this band an oblong spot; and near to the anterior end of the terminal C-spot a round spot. There is a row of coppery punctures near the suture, and a shorter row near the shoulder. The head is purplish blue beneath; the breast and legs green, and clothed with a few whitish hairs. The abdomen is dull red. Length from rather more than three eighths to nearly one half of an inch.

Mr. Scudder also read a paper by the late Dr. Harris,

ON THE SYNONYMY OF THREE NORTH AMERICAN BUTTERFLIES.

There are three North American butterflies, whose nomenclature is very much confused. These are *Danaïs Berenice* of Cramer, *Danaïs Erippus* of Cramer, and *Limenitis Misippus* of Fabricius. The same species have been described under various other names, and the same names have been given to several other species, and have otherwise been misapplied. We have therefore to establish the priority of the names of these three species, and to take care that they do not conflict with the claims of other species. It becomes necessary to identify the species in question with the same as described under other names; and to distinguish them from the different species described under the same names; and lastly we have to decide what names these different species shall bear. The necessity of doing all this will appear by the following statements. The *Berenice* of Cramer is the *Erippus* of Fabricius, but not of Cramer; and it is the *Gilippus* of Smith, but not of Cramer and Fabricius. The *Erippus* of Cramer is the *Archippus* of Fabricius and of Smith, but not of Cramer; it is also the same as the *Plexippus* of Cramer, but not of Linnæus and Fabricius. The *Misippus* of Fabricius is the *Archippus* of Cramer, but not of Fabricius and Smith. The *Berenice* of Cramer is not the *Berenice* of Drury and Fabricius; the *Erippus* of Cramer is not the *Erippus* of Fabricius; and the *Misippus* of Fabricius is not the *Misippus* of Linnæus. For the sake of convenience the various specific names with which we have to deal in clearing up the nomenclature and synonymy of these species may be arranged alphabetically.

(Synonyms are italicized.)

1. Amestris, Drury	=	Junonia Amestris, Doubleday.
Archippus, Cramer	=	Misippus, Fab.
Archippus, Fabricius	=	Erippus, Cr.
Archippus, Smith-Abbot	=	

2. Berenice, Cr.	=	Danais Berenice, Doubl.
Berenice, Dr.	=	
Berenice, Fab.	=	Zingha, Cr.
Berenice, Westwood	=	
3. Bolina, L.	=	Diadema Bolina, Westw.
Disippe, Godart	=	Misippus, Fab.
Disippus, Westw.	=	
4. Erippus, Cr.	=	Danais Erippus, Doubl.
Erippus, Fab.	=	Berenice, Cr.
5. Gilippus, Cr.	=	Danais Gilippus, Doubl.
Gilippus, Fab.	=	
Gilippus, Sm.-Ab.	=	Berenice, Cr.
6. Misippus, Fab.	=	Limenitis Misippus, nobis.
Misippus, L.	=	Bolina, L. (the female.)
7. Plexippus, L.	=	Danais Plexippus, Doubl.
Plexippus, Fab.	=	
Plexippus, Cr.	=	Erippus, Cr.
8. Zingha, Cr.	=	Nymphalis Zingha, nobis.
Zingha, Fab.	=	Amestris, Dr.

Although the *Misippus* of Fabricius and the *Archippus* of Cramer bear the same date, we may venture to give the claim of priority to Fabricius, because the dedication of his work is dated Nov. 1774. Unfortunately the name of *Archippus* must be entirely rejected. By the foregoing table it will be seen that the nomenclature of the three North American species first mentioned, has become confounded with that of five other species, all of which require to be considered and settled at the same time.

March, 1853.

Dr. Winslow exhibited some pieces of stone taken by himself from the centre of a tree at Honoaula, E. Maui, Sandwich Islands.

The tree, called *Corea*, grows in considerable quantity on the sides of Mauna Haleekala. The wood, said to be of a character which the worms would not touch, was being sawed into sheathing for a vessel, and was said to dull the saws quickly. One tree he saw was whitish throughout, and another white on the outer parts with a red centre; from the very heart of the last he took these stony substances, which seemed to be a sort of nucleus around which the woody rings grew; the little pipe of stone ran along the centre, in some places closely embraced by the wood for several inches, while at others a little reddish powder intervened between it and the wood. Whether it is found in all the trees he did not know. The specimens were referred to Dr. Hayes to report upon.

Dr. White presented, in the name of Mr. John H. Brazer, three specimens of *Siredon* from Cañon Lake, fourteen miles north of Great Salt Lake City, the lake being about 8,900 feet above the level of the sea. They are there believed to possess electrical powers, which is probably untrue. The thanks of the Society were voted for the donation.

Dr. C. T. Jackson read a letter from Dr. Evans, announcing the continuance of the efforts to obtain the Oregon meteorite; and alluding to the discovery of a large iron mountain in that Territory, and the occurrence of 47 per cent. of platinum in some of the black sand of the Pacific coast.

Prof. Agassiz gave a sketch of what he considered the best arrangement of a Zoölogical Museum.

In the great collections, he said, even that at the British Museum, the sole object seems hitherto to have been to exhibit animals according to their supposed natural affinities; as systems of classification vary very much, of course no harmony of arrangement can be expected on this plan. He thought something better was now wanted, and he intended to arrange the Cambridge Zoölogical Museum in a totally different manner, viz: according to natural zoölogical provinces; in this way, he hoped to be able to define such provinces, which as yet were but imperfectly known, and to arrive at important conclusions on the correlations of animals of the different classes. He intended to do the same with fossils, showing independent creations and distinct zoölogical provinces in geological as well as modern times. For purposes of study and comparison, to this he purposed to add a very small collection of typical genera and species, exhibiting the natural affinities of animals, — also a third collection, exhibiting the embryonic series of every animal type, — a fourth, embracing the domesticated animals, to show what are species, varieties, breeds, &c., with such products from them as have a commercial value, — and finally, a museum of men, skulls, skeletons, &c., for the study of the human races.

Dr. B. J. Jeffries gave details of his experiments on frogs, alluded to at the last meeting.

In the first frog he injected 80 grains of sugar in 2 drachms of distilled water ; seven hours after, by gas-light, there was no apparent cataract ; it was then placed in water for twenty-two hours, after which it was taken out and died in four hours ; eighteen hours after death, the lens was examined, and a small amount of cataract found on the posterior portion. In the second, the amount of sugar was doubled ; it was kept from water six hours, and, no cataract appearing by gas-light, put again into water, from which it probably soon after escaped ; when found about eighteen hours afterward it was very sluggish, and had by daylight strongly-marked white cataract ; death took place three hours afterward, twenty-four hours after which both lenses presented cataract most strongly marked posteriorly ; that portion toward and about the size of the pupil being free, giving the lenses the appearance of glass beads. In the third, 220 grains were injected ; in two and a half hours cataract was present, and the motions sluggish, and by the end of the third hour death took place ; twenty-four hours after death, an examination showed the same lesion as in the preceding case, only more decided ; the heart was found turgid with blood. In none of these cases had the frogs natural cataract. In connection with the remarks of Dr. Williams at the last meeting, he spoke of a report in the Royal Opthalmic Hospital Journal, for January, 1859, by Mr. France, of four cases of cataract associated with diabetes, in one of which the urinary trouble was diagnosticated from the cataracts.

Mr. Theodore Lyman presented the following: —

DESCRIPTIONS OF NEW OPHIURIDÆ, BELONGING TO THE SMITHSONIAN INSTITUTION AND TO THE MUSEUM OF COMPARATIVE ZOÖLOGY AT CAMBRIDGE.

Amphiura (Forbes).

Amphiura Pugetana, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 3.5 millim. Length of arms, 24.5 millim. Greatest width of arm, without spines, .7 millim. From outer edge of mouth-shield to outer corner of opposite mouth-slit, 1.5 millim. Mouth-shields nearly diamond shaped, the outer and side angles slightly rounded; length to breadth, .3 : .2. Under arm-plates five-sided, with the fifth angle directed inward; length to breadth, near base of arm, .5 : .4. Upper arm-plates bounded within by a strong arch, without by a slight curve; their lateral sides short; length to breadth, near base of arm, .5 : .7, — they do not quite touch each other. Scales of disc mostly rounded, smaller below than above; those above of pretty even size, with a few little ones. Arm-spines 3; sometimes 4, on joints close to disc; evenly tapering, moderately stout, of even lengths; length, near disc, .5 millim. Tentacle-scales 2, small and rounded, placed obliquely side by side. Color, in alcohol: disc, above, light greenish gray; below lighter, radial shields darker; arms, above and below, straw-color, with a faint white line, running lengthwise above.

Variations. The angles of the mouth-shields may be more or less rounded. Among younger specimens, the scales of the disc are more even in size, and the primary plates have their corners not entirely rounded off. The proportion of the arms to the disc varies somewhat, thus: diameter of disc to length of arms, as 3.5 : 24.5, 3 : 21, or 2.5 : 22.5.

This species is distinguished from others of the genus, as follows: *A. Orstedii* has the radial shields longer and separated a part of their length; 4 or 5 spines and upper arm-plates broader. *A. Puntarenæ* has rather longer arms, a small notch in the outer side of the under arm-plates, and the upper arm-plates regularly oval. *A. violacea* has mouth-shields proportionately much smaller and the arms shorter; the color also must be quite distinct. *A. microdiscus* has, even in small specimens, the upper arm-plates touching each other and twice as broad as long. *A. tenera* has upper and lower arm-plates and mouth-shields of a different form. *A. squamata* has differently shaped mouth-shields and much shorter arms. *A. tenuis* stands very near the present species; but the arms, in specimens of the same size, are not more than half as long.

Locality, Puget Sound. Dr. Kennerly.

Smithsonian Institution, Nos. 1037, 1053, 1057.

Amphiura occidentalis, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 5.8 millim. Outer edge of mouth-shield to outer corner of opposite mouth-slit, 2.2 millim. Greatest width of arm, without spines, 1.3 millim. As the arms were somewhat broken, their length could not well be measured; but, from their proportions, they must have been at least eight times the diameter of the disc. Mouth-papillæ rounded; innermost one stoutest, and pointing to centre of mouth. Mouth-shields small, oval diamond-shaped, the angles being so rounded as to give almost a true oval; outer angle making a very slight peak; length to breadth, .4 : .5. Side mouth-shields not meeting within. Under arm-plates square oblong; angles somewhat rounded; outer side with a slightly reëntering curve; 2d plate differs from the rest, being five-sided, with its fifth angle directed inward; it is separated from the rudimentary 1st plate, by narrow prolongations of the side arm-plates. The next three or four plates are in like manner separated, while those further out on the arm are close together, which is an inversion of the usual order. Length of plates to breadth, .4 : .4. Upper arm-plates oblong, with rounded corners; outer side with a slightly reëntering curve; length to breadth, .5 : 1. Scales of disc fine, smooth, and even, above and below; primary plates distinguished by greater size. Arm-spines 3, not tapering, rather stout, rounded at the end, flattened, about as long as the joints. Two small, rounded tentacle-scales. Color, in alcohol: disc, above, faint greenish gray; arms and under surface, straw-color.

Variations. The mouth-shields may be quite oval; the 2d under arm-plate, instead of being five-sided, may resemble the rest.

This species is distinguished from *A. geminata*, by the shape of the mouth-shields and of the upper and lower arm-plates, and in having the mouth-papillæ of the same size; from *A. Chilensis*, by having two tentacle-scales, instead of one.

Locality, Monterey, Cal. Mr. Sayla.

Smithsonian Institution, No. 1054, and No. 1063 (?).

No. 1063 is from Puget Sound, and may be another species. The spines are blunter, the under scales of the disc larger and less crowded, and the under arm-plates rather more rounded. More specimens will settle the question.

Amphiura urtica, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 6 millim. Outer side of mouth-shield to outer corner of opposite mouth-slit, 2 millim. Width of arm without spines, .8 millim. Length of arms, about eleven times diameter of disc, (a specimen having a diameter of disc 5.5 millim. had 55 millim. length of arm). Mouth-papillæ rounded and bead-like. Mouth-shields nearly square, with an angle directed inward; outer angle truncated and making a slight peak; other angles slightly rounded. Length to breadth, .5 : .5. Side mouth-shields not meeting within. Upper arm-plates irregular oval, outer side less curved than inner side; length to breadth, .5 : .7. Under arm-plates scarcely touching each other; inner one five-sided, the rest nearly square, with a strong notch in the outer side; length to breadth, .4 : .4. Scales of disc fine and even; some of those near margin of disc bearing very fine prickles on their edges. Primary plates not conspicuous. Arm-spines 3, about as long as the joints, delicate, sharp, regularly tapering. Tentacle-scales 2, both of them small and delicate. Color, in alcohol: upper and under surface of disc dark greenish gray, with a margin of light; arms light straw-color.

Variations. The mouth-shields vary in shape to an unusual degree; sometimes they have a strong peak without, and again none at all; they may be nearly rectangular, or almost oval, and some are not far from round. The under arm-plates may be more or less pentagonal; but, in the adult, most of them are nearly square. The young, with a disc 2.5 millim. in diameter, have the under arm-plates pentagonal, with a deep notch in their outer side, and separated by the side arm-plates; they have also, on the back of the disc, a conspicuous rosette of round, primary scales.

This species differs from *A. occidentalis*, in its notched under arm-plates, sharp spines, and prickly scales of the disc. It is a somewhat aberrant species, and by its prickly scales approaches *Amphiura scabriuscula*.

Locality, Puget Sound. Dr. Kennerly.

Smithsonian Institution, No. 1041.

Amphiura Wurdemanii, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 9.5 millim. From outer edge of mouth-shield to outer corner of opposite mouth-slit, 3.5 millim. Width of arm, without spines, 2.2 millim. Arms remarkably flat, wide, and little tapering; as they were broken, the length could not be known, but it seemed not less than ten times the diameter of the disc. Teeth broad and flat, with free edge a little curved. Mouth-papillæ 3 on each side, rounded and bead-like; innermost one placed below the teeth, and running somewhat upward. Mouth-shields shaped something like the sole of a shoe, very long and narrow, small, with their outer end rounded, and their inner one a rounded point, wider within than without; length to breadth, .8 : .5. Side mouth-shields almost as large as mouth-shields proper, broader without than within, somewhat curved. Under arm-plates squarish, rather broader than long, overlapping each other a little; outer side bounded by a slightly reëntering curve, corners rounded; length to breadth, (13th plate,) .5 : .7. Upper arm-plates very short and broad, overlapping, bounded without by a reëntering curve; outer corners strongly rounded, length to breadth, .4 : 1.7; they are occasionally broken in two. Scales of disc fine, of pretty even size, rather thicker than are usually found in the genus; those below somewhat finer; around edge of disc, a little fence of small, flat, narrow scales, or papillæ, standing upright; this fence is interrupted opposite the radial shields. Radial shields broad, blunt, pear-seed shaped, sometimes separated by a wedge of three or four scales, sometimes joined by their sides; length to breadth, 2 : 1. Arm-spines 3, short, stout, broad, rounded at the end, somewhat flattened, a little longer than joints, nearly alike in shape and size. Tentacle-scales 2, short, broad, and thin, with curved edges.

Color, in alcohol: above, disc nearly white; arms straw-color, with irregular bands of dark brown; below, arms straw-color, interbrachial spaces white, mouth-shields brown.

This species belongs with those *Amphiuræ* that have the upper row of the lower scales of the disc strongly developed and standing upright, thus making a sort of fence. It differs from *A. septa*, in the shape of the mouth-shields, and in wanting spines on the upper surface of the disc; from *A. marginata*, in the irregular arrangement of the disc-scales, the different proportions of the arm-plates, &c.

Locality, Captiva Key, Charlotte's Harbor, Florida. Mr. Wurdeman.

Museum of Comparative Zoölogy, Cambridge.

Ophioglypha, (Lyman.)

Ὄφις. γλυφή (notch).

Synonyme: *Ophiura*, (Forbes, non Lamk.)

The genus *Ophiura*, as defined by Forbes and as used by Dr. Lütken, cannot stand. Dr. Lütken himself points out the fact, that Lamarck, in his first edition of "Système des Animaux sans Vertèbres," (1801,) took, as the type of his genus *Ophiura*, *Asterias longicauda*, (Linck.) which is *Ophioderma longicauda*, (Müll. & Trosch.) *Ophiura*, then, is the proper generic name for *Ophioderma*, and *Ophioderma* must be dropped. It becomes therefore necessary to give a new name to the genus called *Ophiura* by Forbes, and I propose that of *Ophioglypha*.

Ophioglypha Lütkenii, (Lyman,) sp. nov.

Description of a Specimen. Diameter of the disc, 18 millim. Outer edge of mouth-shield to outer corner of opposite mouth-slit, 8.5 millim. Width of arm, without spines, 3.5 millim. Length of arm, 90 millim. Mouth-papillæ like thorns; a bunch of about ten at the point of the jaw, and two or three scattered ones, on each side, placed above the scales of innermost pair of tentacle-pores. Teeth about 9; long, narrow, flat, rather sharp, arranged sometimes in single, sometimes in double rows. Mouth-shields shield-shaped, with an angle turned inward, and outer side rounded; lateral corners somewhat projecting; length to breadth, 3 : 3. Under arm-plates, at base of arm, broad, triangular, with lateral corners somewhat rounded; length to breadth, 1 : 2.5. Further out on arm, the plates, as is usual in the genus, grow smaller and smaller, from being encroached on by the side arm-plates. Upper arm-plates much broader than long, and having the outer and inner sides straight and parallel; length to breadth, near base of arm, 1.2 : 3.5. Scales of disc, above and below, not arched or swelled, but lying very flat and evenly; primary plates rounded, and conspicuous by their size. Notches in disc, at base of arms, deep, admitting fully four arm-plates. Comb on the edges of each notch made up of thick, flat, spreading papillæ, crowded side by side, in a continuous line. These papillæ are only 6 or 7; they decrease in length as they pass under the disc, where they join the narrow, toothed edge that runs along the margin of each genital slit. On base of arm proper, no comb, or line of papillæ. Arm-spines 3, tapering, sharp; upper one longest, and equal to about 1½ joints; lowest one shortest, and equal to a little less than one joint. Tentacle-scales of innermost pair of pores short, stout, crowded, flattened; usually 4 or 5 on outer side, and 4, somewhat smaller, on inner side, of each pore. Rest of tentacles with only one round and rather thick scale, but there may also be a little tooth, just outside the tentacle. Color, in alcohol: above, bluish gray, (a sort of clay-color,) with darker markings; the arms the same, with darker bands; below, arms whitish; inter-brachial spaces of a purplish hue, with white spots.

This species is nearest *O. Sarsii*, but differs in the want of a row of papillæ on the base of the arm, above; in having the papillæ of the arm-comb and of the inner pair of tentacle-pores more crowded and blunter; in the finer and sharper mouth-papillæ, &c.

Locality, Puget Sound. Dr. Kennerly.

Smithsonian Institution, No. 1039.

There are also, in the Smithsonian collection, specimens from Puget Sound, which closely resemble the young of *O. Sarsii;* but, as they are not very well preserved, they must remain for the present in doubt.

OPHIURA, (Lamk. non Forbes.)

Ophioderma, (Müll. & Trosch.) *Ophiura teres*, (Lyman.) sp. nov.

Description of a Specimen. Diameter of disc, 32 millim.

Outer edge of mouth-shield to outer corner of opposite mouth-slit, 12 millim. Width of arm, without spines, 7 millim. Length of arm, 133 millim. Mouth-papillæ, about 18 to each angle of mouth, small, tooth-like, somewhat crowded, the innermost, and the outermost but one, on each side, broader and larger than their neighbors. Teeth broad, flat, short, with the free edge curved, the upper ones more pointed. Mouth-shields very broad heart-shape, usually presenting three rounded lobes, of which one is directed inward; length to breadth, 2.5 : 3.5. Side mouth-shields covered by granulation of disc. Under arm-plates small, squarish, bounded without by three sides, with much rounded angles, and within by a slightly curved line; length to breadth, (13th plate,) 1.5 : 2. The first five plates are smaller and narrower; and, between the 1st and 2d, 2d and 3d, and 3d and 4th, there is a pair of pores. Upper arm-plates very short and wide; length to breadth, 1.7 : 6.5. All the plates, except those just at the tip of the arm, are broken in irregular pieces; those near base of arm usually in 5; those near its tip, in 3, or 4; so that the upper surface seems covered with an irregular mosaic. Granulation of disc fine and even, covering radial shields and the whole disc, above and below; near base of arms, above, are sometimes one or two little naked plates of variable size. Arm-spines short, flat, tapering, rather stout, nine in number; three lowest ones rather longer than the rest, and lowest one longest of all; upper ones about half as long as side arm-plates. Two tentacle-scales, longer than broad, flattened, outside one rather shorter and cut off more square at the end. Color, in alcohol: above, purplish brown, with upper arm-plates closely speckled with lighter; below, chewing apparatus, lowest arm-spines, and under arm-plates yellowish white; the rest purplish brown.

Variations. The mouth-shields may differ somewhat in shape; and the under arm-plates may be light brown.

This species at once strikes the eye by its short, rounded arms, covered above by a multitude of irregular pieces. It is distinguished from *O. Panamensis*, by broken arm-plates, proportionately shorter arms, and absence of radial shields; from *O. variegata*, by proportionately shorter arms, granulated side mouth-shields, &c. It most resembles the dark variety of *O. cinerea* (*O. Antillarum*, Ltk.) of the West Indies, but differs in having shorter arms and covered radial shields.

Locality, Panama. Rev. T. Powell.

Smithsonian Institution, No. 1051.

There is a specimen in the Smithsonian Institution (No. 1055) which may be the young of this species; it has the arms somewhat longer, however, in proportion, and the pattern of the color is quite different; the mouth-shields also are more rounded. It is from Panama.

Ophiopholis, (Müll. & Trosch.)

Ophiopholis Kennerlyi, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 8 millim. Outer edge of mouth-shield to outer corner of opposite mouth-slit, 3.4 millim. Width of arm, without spines, 2 millim. Length of arm, 35.3 millim. Mouth-papillæ thin, flat, square, with corners rounded; three on each side. Teeth short, broad, square, stout. Mouth-shields very closely soldered with side mouth-shields; rather small, nearly oval; length to breadth, .7 : 1. Under arm-plates nearly square, corners a little rounded, and outer side bounded by a slightly reëntering curve; length to breadth, 1 : 1. Side arm-plates small, and little prominent. Upper arm-plates irregular oval, sometimes broken in two, more or less encroached on by supplementary pieces, which bound their outer and lateral sides; length to breadth, near base of arm, .8 : 1.5. The supplementary pieces form a close line; they are thick and angular, vary somewhat in size, and, near base of arm, from seven to ten in number; further out, fewer; and, near the tip, none at all. Disc, above, closely and evenly covered with round grains, among which appear a few small, round, primary plates; one in centre and one or two in each brachial space; none at all in the interbrachial spaces; diameter of central plate, .7 millim. Disc, below, closely set with short, stout, smooth spines, about .3 millim. long. Arm-spines very stout, short, thick, rounded; the longest about length of arm-joints; lowest one much the shortest, blunt, conical; 2d spine same shape, but longer; 3d and 4th longest, broad, thick, and blunt; 5th same shape, but shorter; usually 5 spines, sometimes, close to disc, 6; near tip of arm the lower spine has the form of a double hook. Color, in alcohol: purplish pink, with obscure bands of a darker shade on arms; an obscure line of whitish running lengthwise of the arms; in the position of each radial shield, an irregular patch of white; below, interbrachial spaces mottled, reddish and white; mouth-apparatus whitish; lower arm-plates whitish, edged with pink; other parts same as upper surface, but lighter.

Variations. A specimen of about the same size as the preceding, had usually three, instead of two, primary plates in each brachial space on the upper surface of the disc, also a distinct line of white, running quite round the disc, near its edge. A young one, with a disc 3 millim. in diameter, had arms 12.5 millim. in length. The arm-spines were more slender, and were thorny, as were also the spines and grains of the disc. In the centre of the disc a patch of white, and another at the base of each arm.

This species is interesting, as being the second of a genus which before had but one member. It is distinguished from *O. aculeata*, by the close and regular granulation of the disc, without spines above, and by having no primary plates in the *inter*brachial spaces. It seems, also, to be a much smaller species.

Locality, Puget Sound. Dr. Kennerly.

Smithsonian Institution, No. 1062.

Ophiothrix, (Müll. & Trosch.)

Ophiothrix lineata, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 10 millim. From outer edge of mouth-shield to outer corner of opposite mouth-slit, 4.5 millim. Width of arm, without spines, 2 millim. Length of arm, 63 millim. Tooth-papillæ fine, numerous, cylindrical, resembling short, blunt spines. Mouth-shields broad oval, with a slight peak toward mouth; length to breadth, 1 : 1.5. Disc, above, with large radial shields, which are smooth, or very nearly so, shaped like an elongated triangle, the acute angle being turned inward, separated by a distinct stripe; length to breadth, 2.8 : 1.7; the narrow brachial and broad interbrachial spaces form ten stripes, radiating from the centre; both centre and stripes are covered with elongated scales, (only to be seen on dried specimens,) and these, again, bear many little grains, each with a crown of thorns; below, interbrachial spaces quite naked. Upper arm-plates broad hexagonal, with corners a little rounded, the two side angles more acute than the others; length to breadth, .7 : 1.5. Under arm-plates nearly oval, but with some indications of angles; length to breadth, .8 : 1.2. Arm-spines rather stout, flattened, cut off square at the end, varying in length; about six in number on joints close to disc; two upper ones much the stoutest and longest, and of about equal length, viz: 2.7 millim.; sometimes, however, the upper one is very short and stout; three lowest spines minute and slender, the longest not longer than .8 millim.; a little further out on arm only five spines, two large, one medium, and two small. The large spines have, on their flat sides, diagonal rows of smooth, microscopic tubercles, which give them a wavy, or corrugated appearance. One tentacle-scale, represented by a microscopic thorn. Color, in alcohol: above, disc uniform, light, Indian red; arms dull purplish, with a very distinct longitudinal line of black, bounded on each side by a clear white line; spines glassy, with a pink hue; below, mouth-apparatus and under arm-plates white; interbrachial spaces Indian red without, but yellowish toward the mouth.

Variations. The number of spines sometimes rises to nine, of which five are large and four very small. The mouth-shields, instead of being regularly oval, may have their lateral corners quite sharp.

This species may be readily distinguished from all others of Florida, by the granulation of the disc, the character of the spines, and the regular form of the upper arm-plates.

Locality, east coast of Florida. Prof. Agassiz.

Museum of Comparative Zoölogy, Cambridge.

CORRECTIONS IN THE NOMENCLATURE OF OPHIURIDÆ.

No one has yet been able to identify Say's *Ophiura appressa.* It is evidently a true *Ophiura*, (*Ophioderma*, M. & T.) but the question is, which species? *O. serpens*, *guttata*, *brevicauda*, and *variegata* disagree with Say's description, in having all the arm-spines of *equal* length. *O. cinerea* (*Antillarum*, Ltk.) has radial shields, and has the upper arm-plates broken. *O. rubicunda* disagrees in having radial shields, and in color. *O. squamosissima* differs in its peculiar scaly arms. Finally, *O. elaps* disagrees in the number and form of its spines. No species remains but *O. virescens*, described by Dr. Lütken, and this is doubtless the species previously described by Say; first, because the *gray* variety agrees perfectly with Say's description; second, because it is abundant on the coast of Florida; and third, because it is *not* any of the known Florida or West Indian species. *Ophioderma virescens* (Ltk.) should therefore be written *Ophiura appressa*, (Say.)

Ophioderma Antillarum (Ltk.) agrees with Müller and Troschel's description of *Ophioderma cinereum, if the same sized* animals be compared; and *O. cinereum* does not agree with any other known member of the genus. Unless, therefore, a direct comparison of the original specimen in the Vienna Museum gives a different result, *cinereum* must take the precedence, and the name must be written *Ophiura cinerea.*

Asterias cordifera (Bosc) is considered by Dr. Lütken as identical with a species from the West Indies, described by him as *Amphiura cordifera.* This cannot well be. *Amphiura cordifera* (Ltk.) is not found at all in Carolina, where Bosc described his *Asterias* as common. A slight comparison of the descriptions will show that Lütken's Ophiuran disagrees with that of Bosc, in the length of the arms, form of the disc-scales, separation of the radial shields, &c. On the other hand, it is plain that *Asterias cordifera* is *Ophiura elongata* (Say); for this species, therefore, the name *Amphiura cordifera* must be reserved, and a new specific name given to *Amphiura cordifera*, (Ltk.)

Ophionereis triloba (Ltk.) is the same as *Ophiolepis annulata*, (Le Conte.) It should therefore be written *Ophionereis annulata.* Dr. Le Conte mistook one tentacle-scale for two.

Concerning the Ophiuran faunæ that characterize the western coasts of Europe and of North America, and the eastern coast of North America, including the West Indies, not enough is known to give fully reliable information. But some characteristic limits may, nevertheless, be pointed out. Starting with the northern seas of Europe, north of 50°, we find several species, such as *Ophiopholis aculeata*, *Ophioglypha Sarsii*, and *Ophiacantha spinulosa*, that pass northward and westward, through the cold temperate and frigid regions, and then follow the coasts of Greenland and America southward, reaching nearly to lat. 40°, or about 10° further south than they appear on the European coast. On the other hand, there are species, such as *Amphiura filiformis* and *A. brachiata*, that do not pass to the American shores; and others, such as *Amphiura tenuis* and *Ophiolepis* (?) *robusta*, (Ayres,) that do not pass to the European shores. Thus, there are two faunæ, quite distinct in some species, but having others also in common, that pass from one to the other, through the Arctic seas. Crossing now the American continent, we find, near lat. 50°, the familiar forms of an *Ophiopholis*, very like *Ophiopholis aculeata*, and an *Amphiura* closely resembling *A. tenuis ;* there is still further an *Ophioglypha* which at once recalls *O. Sarsii ;* yet all these are distinct species, illustrating faunæ of a similar character. Returning now to the east coast, and passing south of Cape Cod, lat. 42°, we come on new species and leave the others behind. Here is seen the genus *Ophiura*, (*O. olivacea*,) an adventurous traveller from more southern waters. At Charleston, near lat. 32°, a set of species quite novel again surprises the naturalist; here are *Ophiothrix angulata*, *Amphiura cordifera*, and the slender-armed *Amphiura gracillima.* This group has some analogy to that found in the southern Mediterranean, but the resemblances are faint, and no longer strike us like those of the northern faunæ. Still going southward, the fauna again changes, and near Cape Florida, lat. 26°, the animal world of the Gulf of Mexico and the Antilles opens upon us, with all its richness. Here are the characteristic *Ophiocoma crassispina*, *Ophiura appressa*, *Ophiopsila Rusei*, *Ophiothrix Orstedii*, and many others. In Central America, crossing the few miles of land that separate the two great oceans, we are surprised to find an Ophiuran fauna, the counterpart of that of the Gulf; a fauna that is wonderful for its close similarity and for its invariable difference. An unpractised eye might well confound *Ophionereis reticulata* with *O. annulata*, *Ophiocoma crassispina* with *O. Æthiops*, and *Ophiothrix violacea* with *O. spiculata.* Of the coast of California not enough is known to make any comparisons.

In reference to this paper, Prof. Agassiz made some remarks on the principle which he thought ought to govern zoölogical nomenclature; viz: that each species should be indicated, not necessarily by the name of the first describer of the species nor by that of the one who established the true genus, but by his who combines originally or afterward the true generic and specific names. He instanced *Melolontha vulgaris*, (Linn.) *Cossus ligniperda*, (Fabr.) and *Ophiura longicauda*, (Lyman.)

Dr. John Evans, of Washington, D. C., was chosen a Corresponding Member, and Messrs. A. E. Verrill, E. S. Morse, and J. L. Foley, of Cambridge; Edward S. Ritchie, of Brookline; William Edwards, of South Natick; and J. Brooks Taft, of Boston; Resident Members.

DONATIONS TO THE MUSEUM.

October 5. Thirty microscopic slides from E. Samuels. *Chætodon* from the Sandwich Islands; by Dr. C. F. Winslow. Large specimen of stalactite from the Mammoth Cave, Kentucky; by Alvin Adams, Esq.

October 19. Fishes from Sandwich Islands, among them *Goniobatis meleagris*, (Ag.); two specimens of the crustacean genus *Ranina*, and a cuttle fish, from the same locality; by Dr. C. F. Winslow. *Odontaspis griseus*, from Massachusetts Bay; by Dr. D. H. Storer. Two snakes and a skink, locality unknown; by Mr. James Walker, of Charlestown.

November 2. Specimen of *Sigillaria obovata?* from the Joggins, Nova Scotia; by Prof. W. B. Rogers. Bottle of sand thrown up from the volcano of Fuego in Central America in 1855, and a piece of vegetable wax from that region; by Mr. J. M. Barnard. The heart of a *Boa constrictor*, from South America; by Mr. J. W. P. Jenks. *Vespertilio pruinosus*, Massachusetts; by C. J. Sprague.

November 16. A *Tetraodon* from the Sandwich Islands; by Dr. C. F. Winslow. Radiates, Ascidians, and other marine specimens, from Eastport, Me.; by Lieut. Miller. *Spermophilus tridecimlineatus*, and *Erismatura rubida*, from Illinois; by Mr. Samuel Clark, of Chicago.

December 7. *Lophius piscatorius*, from Massachusetts Bay; by J. A. Cutting. An *Ostracion*, and shells from the Sandwich Islands; a California quail, and mass of adipocire from the Pacific Ocean; by Dr. C. F. Winslow. An upper molar tooth of the Asiatic elephant, and a bottle of snakes and insects from the Cape of Good Hope; by Mr. James Walker, of Charlestown.

December 21. Half section of a diseased tooth of a sperm whale; by Mr. George H. Folger. Several specimens of snakes, *Anableps*, and *Didelphis*, from Surinam; by Dr. C. H. Hildreth, of Gloucester. Small crustacean from Sandwich Islands; by Dr. C. F. Winslow. Three specimens of *Siredon*, from vicinity of Great Salt Lake; by Mr. John H. Brazer.

BOOKS RECEIVED DURING THE QUARTER ENDING DEC. 31, 1859.

About Grasshoppers and Locusts. By Alex. S. Taylor. Fol. Pamph. Monterey, Cal. *From the Author.*

The Oxford Museum. By H. W. Acland, M. D., and John Ruskin, M. A. 12mo. London. *From S. H. Scudder.*

Preliminary Report on the Geology of Vermont. By Ed. Hitchcock. 8vo. Pamph. Montpelier, 1859. *From G. F. Houghton.*

Life of John C. Warren, M. D. By Edward Warren, M. D. 2 vols. 8vo. Boston, 1860. *From J. M. Warren, M. D.*

Observations on the Genus Unio. By Isaac Lea. 4to. Pamph. Philadelphia. Vol. 7, Part 1, of the Philosophical Society's Transactions. *From the Author.*

Catalogue of the Public Library, New Bedford, Mass. 8vo. 1858. *From the Trustees.*

Edinburgh New Philosophical Journal. Vol. X. No. 1. *From Prof. H. B. Rogers.*

Descriptions of Salmonidæ, from the Northwest Coast of North America. By G. Suckley, M. D. 8vo. Pamph. *From the Author.*

Geological Report of the Southwest Branch of the Pacific Railroad of Missouri. By G. C. Swallow. 8vo. St. Louis, 1859. *From the Author.*

Notes on Figures of Japanese Fish. By J. C. Brevoort. 4to. New York, 1856. *From the Author.*

Dyas et Trias, ou le Nouveau Grès Rouge en Europe. Par J. Marcou. 8vo. Pamph. Genève. *From the Author.*

Geological Sketch of the Estuary, &c., of Judith River. By F. V. Hayden. Also, Extinct Vertebrata from Judith River and Great Lignite Formations of Nebraska. By Joseph Leidy. 4to. Pamph. Philadelphia, 1859. *From Joseph Leidy.*

Mémoires et Documents, publiés par la Société Historique de Montreal. 2de Livraison. 1859.

Journal de l'Instruction Publique. Vol. 3. Nos. 1–8. Pamph. Montreal, 1859.

Journal of Education. Nos. 1–8. Vol. 3. 4to. Pamph. Montreal. *From Capt. L. A. H. Latour.*

Remarks on Lepas anatifera, Linn. By G. Lawson, P. D. 8vo. Pamph.

On the occurrence of Cinchonaceous Glands in Galiaceæ, &c. By the Same. 8vo. Pamph.

Papers read to the Botanical Society of Edinburgh. By the Same. 8vo. Pamph. *From the Author.*

Transactions of the Academy of Natural Sciences of St. Louis. Vol. I. No. 3. 8vo. Pamph. 1859.

Bulletin de la Société des Sciences Naturelles de Neuchatel. Tome 4. 2ieme et 3ieme Cahiers. 8vo. Pamph. 1858.

Recueil des Actes de l'Académie Impériale des Sciences, &c., de Bordeaux. 20ieme année. 8vo. 1858. 4me Trimestre.

Zeitschrift für die Gesammten Naturwissenschaften. Jahrgang, 1858. Zwölfter Band. 8vo. Berlin, 1858.

Verhandlungen der K. Zoölogisch-Botanischen Gesellschaft in Wien. 8vo. Jahrgang, 1858.

Report of Proceedings of Geological and Polytechnic Society of West Riding of Yorkshire. 8vo. Pamph. 1858–9. Leeds.

Leeds Philosophical and Literary Society Annual Report for 1858–9. 8vo. Pamph. Leeds.

Jahresbericht der Naturforschenden Gesellschaft in Emden, 1858. 8vo. Pamph. 1859.

Verhandlungen der Vereins zur Beförderung des Gartenbaues in den König. Preussischen Staaten. 8 Nos. Jan. 1856 to Dec. 1858. Berlin.

Jahrbuch der K.-K. Geologischen Reichsanstalt. IX. Jahrgang. No. 4. Oct. — Dec. 1858. X. Jahrgang. No. 1. 1859. Wien.

Proceedings of the Literary and Philosophical Society of Liverpool.

Wiegmann Archiv für Naturgeschichte. Nos. 5 and 6, 1858. 1 and 2, 1859. Berlin.

Journal of the Royal Geographical Society. Vol. 28. London, 1858.

Proceedings of the Same. Vol. III. Nos. 4 and 5. 1859.

Verhandlungen des Naturhistorischen Vereins der Preussischen Rheinlande und Westphalens. Vierzehnter Jahrgang. Nos. 5–11. Fünfzehnter Jahrgang. Nos. 1–29. 8vo. Bonn, 1857–8.

Recueil des Actes de l'Académie Impériale des Sciences, &c. 21ieme année. 1859. 8vo. Pamph. Paris.

Journal of the Academy of Natural Sciences of Philadelphia. New Series. Vol. IV. Part 2. 4to. 1859.

Proceedings of the Same. Sigs. 15–21. 8vo. Pamph. 1859.

Transactions of the American Philosophical Society. Vol. XII. Part 2. 4to. Philadelphia, 1859.

New York Journal of Medicine. No. 99, for November, 1859.

Canadian Journal of Industry, Science, and Art. Nos. 23, for September, and 24, for November, 1859. Toronto.

Canadian Naturalist and Geologist. Vol. IV. No. 5, for October, 1859.

Proceedings of the Zoölogical Society of London. Part 26, 1858, and Parts 1 and 2, 1859.

Silliman's American Journal of Science and Arts. No. 84. November, 1859.

Annual Report of the Regents of the Smithsonian Institution. 8vo. Washington, 1859. *Received in Exchange.*

Annals and Magazine of Natural History. Vol. IV. Nos. 22, 23, and 24. London, 1859. *From the Courtis Fund.*

Orr's Circle of the Sciences. 9 Vols. 12mo. London, 1854–56.

Reminiscences of Rufus Choate. By Edward G. Parker. 12mo. New York, 1860.

Home and Abroad. By Bayard Taylor. 12mo. 1859.

Twelve Years of a Soldier's Life in India. By Major W. S. R. Hodson. 12mo. Boston, 1860.

Life of Andrew Jackson. By James Parton. Vol. 1. 8vo. New York.

History of Civilization in England. By H. T. Buckle. Vol. 1. 8vo. New York, 1859.

History of the Life and Times of James Madison. By Wm. C. Rives. 8vo. Vol. 1. Boston, 1859.

Recollections of Samuel Rogers. 12mo. Boston, 1859.

History of Methodism. By Abel Stevens, LL.D. 2 vols. 12mo. New York, 1859.

Life of John Milton. By David Masson. Vol. 1. 8vo. Boston, 1859.

Fiji and the Fijians. By T. Williams and J. Clarke. 8vo. New York, 1859.

Forty-four Years of the Life of a Hunter. 12mo. New York, 1859.

Travels in Greece and Russia. By Bayard Taylor. 12mo. New York, 1859.

Thirty Years in the Arctic Regions; or the Adventures of Sir John Franklin. 12mo. New York. *Deposited by the Republican Institution.*

January 4, 1860.

The President in the Chair.

Mr. Edward Hitchcock, Jr., of Amherst, made a communication on the elongated, flattened, and curved pebbles found in the conglomerate of Vermont.

Similar ones were first noticed in the Newport, R. I. conglomerate, where they are found parallel to each other and parallel to the strike. In E. Wallingford and Fairfax, Vt., they are found in a quartz conglomerate, the cementing material being sandstone or talcose schist.

Their origin he considered involved in obscurity; he thought, however, that the distortion must have been effected since their deposition, and while they were in a plastic state; he was at a loss also to explain the frequent occurrence of jointed planes. Chemical and electrical causes had been hinted at by his father, Prof. Hitchcock. The occurrence of crystals of magnetic iron gives evidence of a considerable and moist heat; there is in Vermont no evidence of a trap dyke or other igneous agency within a few miles of their locality, and the influence of the former would have been confined to a few feet on either side.

Dr. C. T. Jackson thought that the smoothness and absence of indentation showed that no change had taken place in the forms since their deposition; they are perfectly polished, as in the stones rolled upon our shingle beaches by the powerful action of the surf; this constant grinding, and rolling up and down, by the force of the waves, would produce various cylindrical forms, and even the crooked and distorted ones exhibited on the diagrams of Mr. Hitchcock; and similar shapes can be seen any day upon the present beaches. Beside, quartz pebbles could hardly have been softened by heat, and, if they were, would have taken different forms from these. The magnetic iron he considered the result of a metalliferous emanation, rising in vapor, as in almost every volcanic eruption, and requiring less than a red heat. They were parallel to each other and to the line of the strata, because they were thus formed originally. In presence of sea-water, a moderate heat would be sufficient to cause the pebbles to be united by a cement of Wollastonite or silicate of lime. He was averse to any theory of their explanation which requires softening after their deposition.

Dr. A. A. Hayes gave the following, as the result of his examination of the mineral substance, found by Dr. C. F. Winslow, occupying the medullary cavity of trees growing in the Sandwich Islands. (See page 190 of the present volume.)

Physical characters. This matter occurs in the form of hollow and sometimes solid, cylinders, about one fourth of an inch in diameter. Small lateral holes are found opening into and through the cylinders; and the color, externally brown, is yellowish gray when freshly fractured.

The hardness is greater than calc-spar or dolomite, and nearly that of fluor-spar. Specific gravity 2.414, and general appearance that of imitative forms of brown iron ore.

Analysis. Boiling distilled water dissolves an organic salt of lime, and the solution has a strong earthy odor.

Carbonate of soda solution takes up crenic and humic acids. There are no other acids or bases present. 100 parts consist of

Organic acids and moisture	14.46
Carbonate of lime	72.82
Magnesia as a base	7.32
Biphosphate of magnesia	2.20
	96.80

A little silica, and a mere trace of carbonate of iron, were detected. The brown color of the surface is produced by humus; and associated with the humic acid and the biphosphate of magnesia is some ammonia, forming a humate of ammonia in the organic part, and double phosphate of ammonia and magnesia in the mineral part.

The carbonic acid is insufficient in quantity to engage both the magnesia and lime, I have therefore regarded the condition of the lime as a carbonate, and the magnesia as in union with crenic and humic acids.

The composition of this substance indicates that crenates of lime and magnesia, and some ammonia phosphate of magnesia, were absorbed from the soil; and in the subsequent decomposition the carbonate of lime formed was rendered more compact and hard by the portion of crenate, which is undecomposed, acting as a cement. The humus and humic acids are the usual attendants of this decomposition.

Although stony matter occurring in trees has been frequently mentioned, the information possessed on the subject had led me to suppose that the mineral part occupied the space near the concentric rings which the section of a tree presents, and not the medullary canal, as in this instance.

Mr. Dillaway, the Librarian, announced the reception of the scientific portion of the library of the late Dr. T. W. Harris, consisting of about 250 volumes, especially rich in the department of Entomology. This valuable donation is due to the liberality of John P. Cushing, Esq., of Watertown, who was also the largest contributor for the purchase of the Harris Cabinet of Insects and Manuscripts, also the property of the Society. The thanks of the Society were voted to Mr. Cushing for this valuable donation. It was also voted that these collections be henceforth known in the Society's halls as the Harris Cabinet and the Harris Library, and be kept separate from the general cabinet and library.

Mr. Scudder, Curator of Entomology, observed that among the volumes was one containing all the rarer tracts of Say, most of which are extremely scarce; among them his New Harmony pamphlets, one of which (on the Heteropterous Hemiptera of North America) is probably the only copy in this country, if indeed it can be found anywhere else. There is a volume of colored drawings by John Abbot, of the Lepidoptera and Coleoptera of Georgia, presented to Dr. Harris by Edward Doubleday, Esq., of England, containing all the originals of the drawings in "Abbot and Smith's rarer Lepidopterous Insects of Georgia," beside many others yet unpublished. Most of the important European works are here, — such as those of Fabricius, Herbst, Dejean, Boisduval, Macquart, Wiedemann, Audinet-Serville, Sahlberg, Coquebert, Schonherr, Gory and Percheron, Aubé, Laporte and Gory, Westwood, Knoch's "Neue Beytrage," and the "Wiener Verzeichniss;" together with nearly complete sets of most of the publications of entomological societies and entomological periodicals. Some of these are from the library of Mr. Say, and contain a few of his notes; many were once possessed by Prof. Peck, the predecessor of Dr. Harris, and one is from the library of Dru Drury; and nearly all are enriched by copious notes of Dr. Harris.

The President gave an account of the Gorilla collection of Mr. Du Chaillu, in New York, made during a residence of three or four years in the country of this largest anthropoid ape, which includes about ten degrees on each side of the equator on the west coast of Africa.

Though affording nothing new in regard to the skeleton, the collection was interesting from containing an extensive series from the quite young to the adult animal. Though the females are said to be the most numerous, ten out of fourteen specimens examined have been males. The cranial capacity ranges in the males from 24 to $34\frac{1}{2}$ cubic inches, the average being 28 or 29;

the weight of the animal being more than that of man, the relative size of the brain is very small; in the lowest human races the cranial capacity is about 75 cubic inches, and the weight of the body about 150 lbs. The variation in the size of the brain is probably accompanied by a considerable variation in intelligence; in many of the lower mammals (as the carnivora) a similar range of variation is observable. There were one or two new chimpanzee-like animals in this collection. In one female adult skull, with a capacity of only 19 cubic inches, the teeth were in a continuous series as in man, whereas in all the anthropoid monkeys there is normally an interval between the upper incisors and canines for the reception of the lower canines; this skull was otherwise abnormal, and in man would be considered idiotic; he regarded this condition as entirely exceptional, and the result of irregular and abnormal development of the jaws from some cause.

In a young gorilla which he had examined, the first dentition was completed and partially shed, but yet the intermaxillary bones were quite distinct; in the chimpanzee they disappear as separate bones during the first dentition, but much later in the gorilla, which in this respect is lower than the former. In the young gorilla, as in other anthropoid apes, there is no indentation of the body at the waist; the back also forms a regular curve, as in the human fœtus or new-born child; this form is less noticeable in the chimpanzee than in the gorilla. The body of the gorilla is more embryonic than that of other animals in this respect, showing that one part may remain embryonic while others go on in development. The legs are short in comparison with the trunk. In the young gorilla the forehead is well formed, and the anterior cerebral lobes are *over* instead of *behind* the orbit, the latter being the case in the adult. The ear comes nearest to the human ear, in its helix, antihelix, tragus, antitragus, and lobule; in the descending scale, the lobule first disappears, and then the top becomes pointed. In the hands the first phalangeal row is involved in the web; in his specimen the toes also were webbed. The muscles are considerably modified from the human, and some new ones are found; in man the hands are only prehensile and tactile, and the feet locomotive; in apes the arms also become locomotive, and less tactile and prehensory. The *deltoid* goes lower down in gorilla than in man, and a lower portion goes to join the *brachialis anticus*, and thus becomes a flexor of the ulna; in the lower mammals the *deltoid* goes still farther down, and acts powerfully in flexing the forearm; in this respect the gorilla is lower than the chimpanzee. The *pectoralis minor* consists of two portions, one going to the coracoid process and the other joining the tendon of the *biceps*; the *subclarius* goes to the coracoid process instead of the clavicle, a condition which sometimes exists as an anomaly in man. In the *latissimus dorsi* the gorilla is higher than the chimpanzee, as in the latter there is a slip which extends to the end of the ulna, which was not found in the gorilla he examined; the *serratus magnus* pulls the scapula down. The *gluteus maximus* is smaller than the *medius*, and is inserted into the outer condyle as well as the upper part of the femur; the flexors of the leg are attached one third of the way down the limb, so that the legs cannot be entirely straightened. Most of the muscles of the human hand are found in the gorilla; but the thumb is supplied by a slip from the common flexor, having no independent long flexor. There are two additional adductors of the thigh, which carry this part much more powerfully inward in the act of climbing.

Messrs. Theodore N. Gill, of Brooklyn, N. Y., and A. S. Packard, Jr., of Brunswick, Me., were chosen Corresponding Members; and Dr. D. D. Slade, Samuel Wells, Jr., Rev. R. C. Waterston, and Edward I. Browne, of Boston, Resident Members.

January 18, 1860.

Dr. C. T. Jackson, Vice-President, in the Chair.

Mr. Scudder, Curator of Entomology, presented the following paper, entitled

A CHRONOLOGICAL INDEX TO THE ENTOMOLOGICAL WRITINGS OF THADDEUS WILLIAM HARRIS, M. D.

It is supposed that Dr. Harris, shortly previous to his decease, was preparing a list of his own writings; yet, though search has been made, no such catalogue has been discovered; and as it now seems to be entirely unlikely that it will be found, I have prepared the following Chronological Index to supply the deficiency, and would present it as being at all events approximately perfect.

A similar Table, in connection with the writings of other American entomologists, has lately been published in the "Linnæa Entomologica;" but that it is quite incomplete may be inferred from the fact that only thirty-two articles were there referred to, while I have detailed no less than ninety-nine. I have seen every article here mentioned with but one exception.

No attempt has here been made to include the writings of Dr. Harris in other departments, though it could have been done without swelling the list very much, for they were not numerous. He wrote one or two articles upon mammals and birds, and a number of short ones upon the varieties of the squash, which are to be found in various agricultural journals.

In preparing this list, diligent search has been made through all our agricultural periodicals; and how numerous those are, in which articles have been found, is easily seen by glancing at the list appended to the Index. Much assistance in perfecting the list has been derived from references by Dr. Harris, discovered in the agricultural works in his library.

1. Upon the natural history of the salt-marsh caterpillar (*Arctia pseuderminea*), with a plate. Massachusetts Agricultural Repository and Journal, vii., No. 4, pp. 322–331, June, 1823.

(*b*) Reproduced without figures in the New England Farmer, i., No. 49, pp. 385, 386, July 5, 1823.

2. Description of four native species of the genus *Cantharis*. Boston Journal of Philosophy and the Arts, i., pp. 494–502, 1824.

(*b*) New England Journal of Medicine, Surgery, and collateral branches of Science, xiii., No. 3, pp. 243–250, July, 1824.

3. Caterpillars (*Clisiocampa Americana*). N. E. F. iv., No. 45, p. 354, June 2, 1826.

4. Peach-tree insect (*Ægeria persicæ*). N. E. F. v., No. 5, p. 33, Aug. 25, 1826.

5. Insects which destroy cocoons of silk-worms (*Dermestes lardarius*). N. E. F. v., No. 5, p. 33, Aug. 25, 1826.

6. Trees. Abstract of a report on the state of the elm-tree in St. James and Hyde Parks, by W. S. MacLeay, (with additional remarks). N. E. F. v., No. 22, pp. 169–171, Dec. 22, 1826.

7. Dr. Hunt's insect (*Tremex columba*). N. E. F. v., No. 27, p. 211, Jan. 26, 1827.

8. Descriptions of three species of the genus *Chremastocheilus*. Journal of the Academy of Natural Sciences of Philadelphia, v., pp. 381–389, Feb. 1827.

9. Minutes towards a history of some American species of *Melolonthæ*, particularly injurious to vegetation. Mass. Ag. Rep. x., No. 1, pp. 1–12, July, 1827.

(*b*) Reproduced in N. E. F. vi., No. 2, pp. 9, 10, Aug. 3, 1827 ; No. 3, pp. 18, 19, Aug. 10, 1827.

10. Insects on peach-trees (*Aphides*). N. E. F. vi., No. 50, p. 393, July 4, 1828.

11. Insects (*Gastropacha velleda*, *Ægeria cucurbitæ*, *Arctia textor*). N. E. F. vii., No. 5, pp. 33, 34, Aug. 22, 1828.

12. The curculio, or worm in fruit (*Conotrachelus nenuphar*). N. E. F. vii., No. 11, pp. 81, 82, Oct. 3, 1828.

13. Contributions to Entomology. N. E. F. vii., No. 12, pp. 90, 91, Oct. 10, 1828.

14. Contributions to Entomology, No. II. N. E. F. vii., No. 15, pp. 117, 118, Oct. 31, 1828.

15. Contributions to Entomology, No. III. N. E. F. vii., No. 16, pp. 122, 123, Nov. 7, 1828.

16. Contributions to Entomology, No. IV. N. E. F. vii., No. 17, p. 132, Nov. 14, 1828.

17. Contributions to Entomology, No. V. N. E. F. vii., No. 20, p. 156, Dec. 5, 1828.

18. Contributions to Entomology, No. VI. N. E. F. vii., No. 21, p. 164, Dec. 12, 1828.

19. Insects on fruit-trees (*Cocci*). N. E. F. vii., No. 24, pp. 186, 187, Jan. 2, 1829.

20. Additional remarks on the bark-louse or *coccus* (woodcuts). N. E. F. vii., No. 37, p. 289, April 3, 1829.

21. American turnip butterfly (*Pontia oleracea*). N. E. F. vii., No. 51, p. 402, July 10, 1829.

22. Corrections and additions for the "Contributions to Entomology." N. E. F. viii., No. 1, pp. 1, 2, July 24, 1829.

23. Contributions to Entomology, No. VII. N. E. F. viii., No 1, pp. 2, 3, July 24, 1829.

24. Insects (*Ægeria pyri*, *Ichneumon hordei*). N. E. F. ix., No. 1, pp. 1, 2, July 23, 1830.

25. Extracts from a paper entitled "Some account of the insect known by the name of the Hessian Fly, and of a parasitic insect that feeds on it, by Thomas Say," (with additional remarks). N. E. F. ix., No. 2, p. 9, July 30, 1830.

26. Locust (*Tettigonia vitis, &c.*). Encyclopædia Americana, viii., pp. 40–43, 1831.

27. A Discourse delivered before the Massachusetts Horticultural Society, on the celebration of its fourth anniversary, Oct. 3, 1832, pp. 54; in a pamphlet entitled, Fourth Anniversary of the Mass. Hort. Soc. Cambridge, 1832. 8vo.

(*b*) Reproduced in N. E. F. xi., 1833. No. 26, p. 204, Jan. 9; No. 27, pp. 212, 213, Jan. 16; No. 28, pp. 200, 201, Jan. 23; No. 29, pp. 225, 226, Jan. 30; No. 30, pp. 236, 237, Feb. 6; No. 31, pp. 244, 245, Feb. 13; No. 32, pp. 252, 253, Feb. 20.

28. Report on the Geology, Mineralogy, Botany, and Zoölogy of Massachusetts, by Prof. Hitchcock. Amherst, 1833. Part viii., Insects. pp. 566–595.

(*b*) Second edition of the same, corrected and enlarged. Amherst, 1835. 8vo. Part viii., Insects. pp. 553–602.

(*c*) The latter part of (*b*), published separately at the same time, under the title, — Catalogue of the Animals and Plants of Massachusetts, with a copious index. Amherst, 1835. Part viii., Insects. pp. 33–82.

29. On a parasite of the honey-bee. Horticultural Register and Gardener's Magazine, pp. 44, 45, Feb. 1835.

(*b*) Reproduced in N. E. F. xiii., No. 30, p. 233, Feb. 4, 1835.

30. Upon the economy of some American species of *Hispa*, (wood-cuts.) Boston Journal of Natural History, i., No. 2, pp. 141–151, 1835, read Feb. 18.

31. Characteristics of some previously described North American Coleopterous insects, and descriptions of others which appear to be new, in the collection of Mr. Abraham Halsey. Transactions of the Natural History Society of Hartford, (with a colored plate.) communicated Dec. 23, 1835, No. 1, pp. 65–91, 1836. 8vo. Hartford, Conn.

32. Report of the Commissioners on the Zoölogical Survey of the State, (containing) Dr. Harris's Report (on Coleoptera). pp. 57–104. April, 1838. 8vo. Mass. House Document, No. 72.

33. Remarks upon *Scarabæus goliatus*, and other African beetles allied to it. Journal of the Essex County Natural History Society, i., No. 2, pp. 101–107. 1839. 8vo. Salem, Mass.

34. Remarks upon the North American insects belonging to the genus *Cyrchus* of Fabricius, with descriptions of some newly detected species. Bost. J. of Nat. Hist. ii., No. 2, pp. 189–204, Feb. 1839, read Aug. 15, 1838.

35. Worms in seed corn (*Butalis cerealella*). Yankee Farmer, v., No. 6, p. 43, Feb. 9, 1839.

36. Descriptive catalogue of the North American Insects belonging to the Linnæan genus *Sphinx*, in the cabinet of the author. American Journal of Science and Arts, xxxvi., No. 2, pp. 282–320, July, 1839. 8vo.

37. A Report on the Insects of Massachusetts, injurious to vegetation, published agreeably to an order of the Legislature, by the Commissioners on the Zoölogical Survey of the State. Cambridge: Folsom, Wells & Thurston, 1841. 8vo.

(*b*) Another impression of the same, printed at the charge of the author, entitled — A Treatise on some of the Insects of New England, which are injurious to vegetation. Cambridge: published by John Owen, 1842.

(*c*) Same title as (*b*); second edition. Boston: printed by White & Potter, 1852.

38. Wheat insects (*Calandra granaria*, *Tinea granella*, *Œcophora cerealella*). N. E. F. xix., No. 38, p. 300, March 24, 1841.

39. Wheat insects, continued (*Cecidomyia tritici*). N. E. F. xix., No. 39, pp. 306, 307, March 31, 1841.

40. Memorandum on the larva of *Papilio Philenor*. Newman's Entomologist, Part ii., No. 4, pp. 60, 61, April, 1841.

41. Remarks on some North American Lepidoptera, by Edward Doubleday, Esq., including a communication from T. W. Harris, M. D., of Boston, U. S. (*Dryocampa? Saccophora Melsheimeri*) (wood-cuts). Newm. Ent., No. 7, pp. 99–101, May, 1841.

42. Plum-tree grubs (wood-cuts). N. E. F. xix., No. 51, p. 405, June 23, 1841.

43. Apple-tree borer, *Saperda bivittata* (wood-cut). Massachusetts Ploughman, i., No. 17, Jan. 22, 1842.

(*b*) Reproduced in N. E. F. xx., No. 33, pp. 260, 261, Feb. 16, 1842.

44. The squash-vine destroyer (*Ægeria cucurbitæ*) (wood-cut). N. E. F. xx., No. 33, p. 260, Feb. 16, 1842.

45. Squash-vine destroyer (*Ægeria cucurbitæ*). Mass. Plough. i., No. 37, June 11, 1842.

46. A new disease of the plum. Hovey's Magazine of Horticulture, viii., pp. 247, 248, July, 1842.

47. Blight-beetle (*Tomicus pyri*). Mass. Plough. ii., No. 38, June 17, 1843.

(*b*) Reproduced in N. E. F. xxii., No. 3, p. 21, July 19, 1843.

48. The disease of the sycamore-tree. N. E. F. xxi., No. 50, p. 406, June 21, 1843.

49. Apple-worm, curculio, plum grub (*Carpocapsa pomonella*, *Conotrachelus nenuphar*). N. E. F. xxii., No. 2, p. 13, July 12, 1843.

50. Description of an African beetle allied to *Scarabæus polyphemus*, with remarks upon some other insects of the same group. Proceedings of the Boston Society of Natural History, i., pp. 151–153, read Nov. 1, 1843, (signatures Nov. and Dec. 1843).

51. Description of an African beetle, &c., as above (with steel plate). Bost. J. of Nat. Hist. iv., No. 4, pp. 397–405, Jan. 1844.

52. Coated Saperda of the linden-tree (*Saperda vestita*). Farmer's Cabinet, viii., No. 7, pp. 213, 214, Feb. 15, 1844.

53. Some account of the insect that attacks the grape-vine (wood-cuts) (*Procris Americana*). Hovey's Mag. x., pp. 201–205, June, 1844.

54. A new depredator of the orchard (*Clisiocampa sylvatica*). N. E. F. xxii., No. 52, p. 412, June 26, 1844.

55. Destructive insects on peach-trees and grape-vines at Nantucket (*Cocci*). N. E. F. xxiii., No. 1, pp. 4, 5, July 3, 1844.

56. Cucumber skippers (*Smynthurus cucumeris*) (wood-cuts). Mass. Plough. iii., No. 42, July 20, 1844.

57. Remarks upon *Saperda vestita*, the borer of the linden-tree, with extracts from letters upon the same insect (wood-cuts). Hovey's Mag. x., pp. 330–333, Sept. 1844.

58. Insects in the corn (*Butalis cerealella*). Far. Cab. xi., No. 4, pp. 106, 107, Nov. 16, 1846.

59. Microgasters. Boston Cultivator, ix., No. 18, p. 138, May 1, 1847.

60. On the blights of the pear-tree (*Tomicus pyri*). Downing's Horticulturalist, ii., No. 8, pp. 365–367, Feb. 1848.

61. Canker-worms (*Anisopteryx vernata*). Prairie Farmer, viii., No. 6, pp. 172, 173, June, 1848.

(*b*) Reproduced in Mass. Plough. vii., No. 39, June 24, 1848.

62. The potter-wasp (*Eumenes fraterna*) (wood-cut). Bost. Cult. x., No. 29, p. 225, July 15, 1848.

63. Correspondence on the black-wart of the plum-tree (*Cicada*). Down. Hort. iii., pp. 277–279, Dec. 1848.

64. Canker-worms (*Anisopteryx vernata*). Bost. Cult. xi., No. 47, p. 376, Nov. 24, 1849.

65. *Termites*. New Orleans Picayune, (late in 1849 or early in 1850).

66. Description of some species of Lepidoptera from the northern shores of Lake Superior, (lithographic plate,) Lake Superior, by Louis Agassiz. Boston, 1850. 8vo. Art. ix., pp. 386–394.

67. Saw-fly of the raspberry, *Selandria* (*hoplocampa*) *rubi* (wood-cuts) (a part of a letter to Miss Darling). N. E. F. (new series) ii., No. 2, p. 33, Jan. 19, 1850.

68. Insects on potatoes (*Baridius trinotatus*). N. E. F. ii., No. 13, p. 204, June 22, 1850.

69. Potato-bug (*Cantharis vittata*). Prair. Far. x., No. 8, p. 247, Aug. 1850.

70. Injurious insects (*Conotr. nenuphar*, *Carpocapsa pomonella*, *Aphides*, *Clisio. Americana*, *Anisop. vernata*, *Macr. subspinosus*). N. E. F. ii., No. 16, p. 252, Aug. 3, 1850.

71. Canker-worms (*Anisopteryx vernata*). Mass. Plough. x., No. 8, Nov. 23, 1850.

72. Canker-worms (*Anisopteryx vernata*). Mass. Plough. x., No. 33, May 17, 1851.

73. The currant-tree borer (*Ægeria tipuliformis*) (wood-cut). Hovey's Mag. xvii., pp. 241–244, June, 1851.

74. Plum weevils (*Conotrachelus nenuphar*). Bost. Cult. xiii., No. 24, p. 187, June 14, 1851.

(*b*) On the curculio. Down. Hort. vi., p. 341, July, 1851.

75. Letter on potato-rot. Salem Observer, xxix., No. 28, July 12, 1851.

(*b*) Reproduced in Bost. Cult. xiii., No. 29, p. 228, July 19, 1851.

(*c*) Insects not the cause of the potato-rot. N. E. F. iii., No. 16, pp. 259, 260, Aug. 2, 1851.

76. A new insect depredator (*Capsus quadrivittatus*). N. E. F. iii., No. 17, p. 268, Aug. 16, 1851.

77. Insects on the potato-vine (*Aphides, Phytocoris lineolaris, Haltica cucumeris, Crio. trilineata, Canth. vittata, &c.*) The Journal of Agriculture, i., No. 4, pp. 99–102, Sept. 3, 1851.

78. Chinch-bug (*Rhyparochromus devastator*). Albany Cultivator, viii., No. 12, pp. 402, 403, Dec. 1851.

79. On *Cicindelæ* (wood-cuts). Family Visitor, ii., No. 39, p. 305, Feb. 3, 1852.

80. Canker-worms (*A. vernata*). N. E. F. iv., No. 4, pp. 155, 156, April. 1852.

81. Letter to Dr. Princkle, giving a history of his Report. Fam. Vis. ii., No. 50, p. 398, April 20, 1852.

82. The joint-worm (*Eurytoma hordei*). N. E. F. iv., No. 8, pp. 385, 386, Aug. 1852.

83. The oak-pruner (*Stenocorus putator*). N. E. F. iv., No. 9, p. 425, Sept. 1852.

84. The oak-pruner. N. E. F. iv., No. 10, p. 453, Oct. 1852.

85. Insects in the wheat (*Eurytoma hordei*). J. Ag. iii., No. 10, pp. 290, 291, April, 1853.

86. The palmer-worm (*Rhinosia pometella*). Cambridge Chronicle, viii., No. 30, July 23, 1853.

(*b*) Reproduced in Transactions of the New York State Agricultural Society, xiii., pp. 190–192, 1854. (See No. 90.)

87. The palmer-worm. N. E. F. v., No. 8, pp. 370, 371, Aug. 1853.

88. The rosy *Hispa* and the drop-worm (*Hispa rosea, Oiketicus coniferarum*) (wood-cuts). Down. Hort. viii., pp. 461–464, Oct. 1853.

89. Report on some of the diseases and insects affecting fruit-trees and vines. Proceedings of the third session of the American Pomological Society, and their fifth meeting, held in Boston Boston, 1854. 8vo. pp. 210–218.

(*b*) Reprinted under the title — Report on insects and diseases injurious to vegetation. Boston, 1854. pp. 11.

(*c*) Reproduced in Journal of the United States Agricultural Society for 1854, pp. 197–210, 1855.

90. Letter from Dr. Harris (*Ithycerus noveboracencis*). Trans. N. Y. St. Ag. Soc. xiii., pp. 188, 189, 1854.

(*b*) Reprinted with 86 (*b*) and other matter as — Apple-tree pests, pp. 11–13. 86 (*b*) formed pp. 13–16.

91. Description of *Rhinosia pometella*, Harris. Proc. Bost. Soc. iv., pp. 349–351, read July 20, 1853 (signature Feb. 1854).

92. Extract of a letter to Dr. Kirtland, from Dr. Thaddeus W. Harris, dated Cambridge, March 13, 1854 (*Vanessa milberti*). Annals of Science, Cleveland, Ohio, ii., No 4, p. 100, April, 1854. 8vo.

93. Note upon the insects injurious to the roots of the cultivated grape-vines in North Carolina, in a pamphlet entitled, The grape-vine borer, — in a communication on the grape-vine, by Dr. E. Mitchell, in the Raleigh Register for April 5, 1854. 8vo. pp. 6, 7.

94. Larvæ of the crane-fly (*Tipula* ——). N. E. F. vi., No. 5, p. 210, May, 1854.

95. Canker-worms (*A. vernata*). N. E. F. vi., No. 8, p. 363, Aug. 1854.

96. The *Cetonia Inda*. N. E. F. vi., No. 10, pp. 457–458, Oct. 1854.

97. The Indian Cetonia. N. E. F. vi., No. 10, p. 485, Oct. 1854.

98. The measure-worm (*Geometra niveosericearia*) (wood-cut). Hovey's Mag. xxi., pp. 418–423, Sept. 1855.

99. Rose-bug (*Macrodactylus subspinosus*). Bost. Cult. xvii., No. 36, p. 283, Sept. 8, 1855.

PERIODICALS REFERRED TO.

1. Massachusetts Agricultural Repository and Journal. Boston. 8vo.
2. New England Farmer. Boston. 1st series 4to. 2d series 8vo.
3. Boston Journal of Philosophy and the Arts. Boston. 8vo.

4. New England Journal of Medicine, Surgery, and collateral branches of Science. Boston. 8vo.
5. Boston Journal of Natural History. Boston. 8vo.
6. Proceedings of the Boston Society of Natural History. Boston. 8vo.
7. Massachusetts Ploughman. Boston. Folio.
8. Hovey's Magazine of Horticulture. Boston. 8vo.
9. Boston Cultivator. Boston. Folio.
10. Downing's Horticulturalist. New York. 8vo.
11. Horticultural Register and Gardener's Magazine. Boston. 8vo.
12. Yankee Farmer. Boston. 8vo.
13. Journal of the Academy of Natural Sciences of Philadelphia. Philadelphia. 8vo.
14. Encyclopædia Americana. Philadelphia. 8vo.
15. Newman's Entomologist. London. 8vo.
16. Farmer's Cabinet. Philadelphia. 8vo.
17. Prairie Farmer. Chicago, Ill. 8vo.
18. Salem Observer. Salem, Mass. Folio.
19. The Journal of Agriculture. Boston. 8vo.
20. Albany Cultivator. Albany, N. Y. 8vo.
21. Family Visitor. Cleveland, Ohio. Folio.
22. Journal of the United States Agricultural Society. Boston. 8vo.
23. Transactions of the New York State Agricultural Society. Albany. 8vo.

Dr. J. C. White made a communication on two very interesting and valuable specimens, one the lower jaw of an enormous sperm whale, (*Physeter macrocephalus*, Shaw,) the gift of F. W. Choate, Esq., of Beverly, the other a tooth of the same species, which, though diseased, served beautifully to illustrate the dental development of this animal, and the peculiar change in the same produced by age or accident. The latter was given by G. H. Folger, Esq., obtained through the kindness of Dr. J. B. S. Jackson.

The first belonged undoubtedly to an animal fully 80 feet long, for a portion has been broken from the anterior extremity, probably 3 feet at least. The following are the gross dimensions:

Total length of specimen . . .	16 ft. 4 in.
Length of rami from point of divergence .	6 ft. 4 in.
Breadth of same at widest portion of wing	2 ft. 2 in.
Extent of expansion from one condyle to the other	6 ft.
Area of articulating surface of condyle	7 by 9 in.
Circumference of horizontal bodies in apposition	2 ft. 6 in.
Length of tooth-furrow	11 ft.

The larger tooth sockets, of which but 19 remain, measure 7 inches in length, $3\frac{1}{2}$ in width, and $2\frac{1}{2}$ in depth.

As seen by the above measurements, the tooth-furrows are continued up a foot upon the edge of the rami after their divergence. On comparison with a young specimen exhibited, which is 66 inches only in total length, and contains 25 teeth, we see the alveolar process lying for the distance of 26 inches upon the horizontal portion, and running 10 inches along the edge of the rami. We conclude, therefore, that at this age a much larger proportion of the teeth occupy this situation, and that with increasing maturity and strength they pass forward, and are almost wholly confined to the more advantageous situation of the body.

The teeth are conical, ovoid or flattened laterally, and more or less pointed and worn according to age and usage. They curve forward and toward the median line, and, as is the case, with a single exception, among all the cetacea, are implanted in the alveolar process by a single root. While young they are conical, sharply pointed, and much curved, presenting a reptilian appearance. At this period they are hidden by the gum or project but slightly from it, and in fact are retained in their place through life more by the soft tissues than by any bony surrounding, so that a cabinet specimen containing teeth is seldom met with, as the ligamentous gum, when allowed to become dry, brings away with itself, when removed, the whole series. The development of the tooth matrix, analogous to the same process in fishes, goes on within the gum, and is never inclosed by a bony cavity. Gradually with age the alveolar process deepens; the fang, still a hollow cone filled by the pulp, sinks more deeply into the jaw, and shallow transverse walls of division spring up between the teeth and form the separate sockets. These, however, never close up and grasp the shaft of the tooth as in the mammalia generally, for such a firm setting would be unnecessary for teeth which meet no opponents to clash against, but fall within soft pockets. The bottom of the pits, as well as their septa, are traversed by numerous large canals, through which the long-continued activity of the dental pulp or matrix is nourished and sustained. After many years this loses its vitality, and, not possessing the life-long and unwearied generative power of the rodent's incisor, tapers to a narrow cleft by the contraction of the fang, and solidifies. A small opening, however, is always left, by which the mature tooth may still keep up a low vital connection with the vascular system. This process of development once complete is never repeated.

The structure of the tooth of *Physeter* consists of a hollow cone of dentine surrounded by a coating of cement, which, when first formed, according to Owen, is tipped by a thin cap of enamel. The cement, as in all the cetacea, is very thickly deposited, and especially so on the anterior or convex surface. This is to counteract the attrition by which this face is constantly worn down, as may be seen on the summits of all the specimens in the cabinet. This action, which the dentine resists longer, though according to analysis of a more organic nature, gradually reduces the tooth to a stump after the reparative power of the matrix is exhausted. The tubes of the dentine are arranged at an acute angle with the central axis of convergence, and follow the sub-curves of direction which the tooth assumes. This is the normal development. Not unfrequently, however, a new element enters into their composition, of which traces are often visible in their early stages of growth. This is the production of a deposit within and arising from the dentinal pulp, called *osteo-dentine*, a substance more resembling cement or true bone than the dentine itself; it is a modification of this latter element, in which its cellular matter is arranged in concentric layers, and furnished with radiated cells like the corpuscles of bone. As above stated, and as was well illustrated by a section of an immature tooth, isolated nodules of this material are often found imbedded in the early-formed dentine tissue. Generally, however, it is in more mature teeth, and when the vital powers of the matrix begin to flag, that this is more abundantly formed, and often the remnant of the pulp is converted into it, and thus fills up the cavity of the contracting fang.

A most remarkable development of this substance is exhibited in the specimen alluded to in the beginning as presented by Mr. Folger. Here we see a longitudinal section of an enormous tumor connected with the base of the tooth. This mass is composed of large nodules or lobular conglomerations of *osteo-dentine*, divided in the centre by numerous fissures once filled with pulp, which in time would have been closed up by fresh deposit. The exterior is of an irregular lobulated shape, covered with innumerable warty excrescences and sharp spicula. Laterally and posteriorly the tumor is covered by a bulging plate of the true dentine and cement, by extension from the normal matrices of the posterior portion of the pulp. A few nodules of the same growth are found on the exterior surface of the tooth, and situated high up within the dentinal tissue of the interior; not more, however, than is often met with.

The normal or upper part of the tooth is of the following dimensions. Breadth of surface of an antero-posterior longitudinal section at base, 3 in. Circumference at same part, 8 in. Length of central axis, 5 in. Greatest thickness of cement, 8 lines. Originally the tooth was a very large one, but is now much worn at the tip. On the posterior surface the cement extends downward 6 in. 8 lines, whereas on the anterior or diseased side it is only 4 in. 8 lines in length. Its growth in front was at first checked by an undue development of the dentine matrix, and then entirely obliterated by conversion of the same into this enormous mass of *osteo-dentine*, which extends 6 in. in a perpendicular direction below the termination of the cement, and for the same distance antero-posteriorly. It measures around the circumference 17 in., and is almost wholly confined to the anterior side of a line drawn parallel to the axis of the tooth.

This great outgrowth must of course have produced an absorption of the alveolar process in the direction of its increase, and caused trouble to its neighbor in front. The axis of the tooth must have been changed from the normal, for the lateral portion of its summit has been worn away flat, produced undoubtedly by continued contact with the alveolar ridge of the upper jaw. Unfortunately we have no history connected with the specimen, nor any description of the appearance of the socket which held it.

In reply to various questions, Capt. N. E. Atwood stated that the rorquals or fin-back whales are considered the swiftest of cetaceans, and are rarely attacked by whalers, as they can do nothing with them, and even when killed by a bomb-lance they afford comparatively little oil. The food of the sperm whale, judging from what they eject from the stomach when struck by the harpoon, consists principally of large squids or cuttle-fish. It is estimated that about one fifth of the yield of oil may be generally set down as the amount of spermaceti afforded by a sperm whale.

Dr. B. J. Jeffries announced that he had made an experiment of injecting 2 drachms of pure honey into the dorsal sac of a medium-sized frog; the animal was kept from water, and died in twenty-nine hours with convulsions; twenty-one hours after death there was no appearance of cataract on dissection.

Dr. Henry Bryant read the following paper on two birds from Bogota: —

In the Revuë Zoölogique for 1848, Lafresnaye describes a species of thrush under the name of *Turdus minimus.* Sclater, in his list of Bogota birds, published in the Proceedings of the Zoölogical Society for 1854 and 1855, mentions this species with a doubt as to its specific value; and in his synopsis of American *Turdidæ*, published in the same journal for 1859, quotes it as synonym of *Turdus Swainsonii*, (Cab.) The specimens of this thrush in my cabinet which agree with Lafresnaye's description are certainly specifically distinct from the North American *T. Swainsonii*, and are more easily recognized than some of the other closely allied species of this difficult group. It is much smaller in every respect, — being one inch shorter, 6 inches in length instead of 7; the wing 3.75 instead of 4.15; tail 2.60 instead of 3.10; tarsus 1 instead of 1.12. The bill is broader and stouter, not only relatively but actually. In its color it differs by the much deeper tint of yellowish rufous on the breast, and by the spots being thicker and much darker, particularly toward the abdomen, so as to give the whole under surface a much darker appearance. The light spots at the base of the inner webs of all but the outer three quills are whiter and more distinct, forming a marked band on the inner surface of the wing, which in *T. Swainsonii* is quite indistinct. I think, therefore, that Lafresnaye's name of *minimus* should be restored to it.

In Sclater's list of Bogota birds, published in the Proceedings of the London Zoölogical Society, two species of *Vireo* are mentioned, — *Vireo olivaceus* and *V. Bartramii*. I am not positive that the specimen in my cabinet is identical with those examined by Sclater, but it is certainly neither the *V. olivaceus* nor the *V. Bartramii*. It has been in my possession since 1845, and I have been constantly expecting to see it described, but as it seems to have been neglected, I shall describe it here.

Vireo Bogotensis. Length of skin, 5 to $5\frac{1}{2}$ inches; wing, $3\frac{1}{8}$; tail, $2\frac{1}{16}$; tarsus, $\frac{6}{8}$; middle toe, $\frac{7}{16}$; 2d primary longest, 1st shorter than 3d, and intermediate between it and the 4th. Above, greenish olive, the green tint most conspicuous on the tail-coverts; head plumbeous, with a dirty white line from the nostril over the eye, bordered by a blackish line between it and the cinereous of the crown — most strongly marked above and behind the eye; wings brown, with the edge of the outer webs of all but the first quill of the same olive tint as the back, and the inner webs of all but the first primaries toward the tips bordered with whitish; central feathers of the tail olive, and the outer edge of all but the outer two of the same color; below, soiled white, slightly washed with cinereous and yellowish on the breast; abdomen nearly pure white; crissum clear pale yellow; flanks and hypochondriacs cinereous olive; tarsi with six large scales anteriorly, much more distinctly marked than in *V. olivaceus*. The bill is stouter, and the gonys, instead of being compressed so as to form a distinct ridge toward the tip, is rounded and slightly flattened.

Prof. W. B. Rogers exhibited specimens of fossiliferous slate and sandstone from the Dennis River in Maine, and gave a sketch of the order of stratification in that vicinity and toward the northeast. He referred especially to the conditions of metamorphism of the shales and slates in the neighborhood of Eastport, which, while displaying all the evidences of profound alteration in their increased density and in the development of crystalline and other chemical compounds throughout their substance, give little indication of having been subjected to violent agencies of a mechanical kind. He also spoke of the enormous extent to which coarse conglomerate rocks are intercalated among the slates and sandstones of the sections lately examined by him in this northeastern part of Maine, and called attention to the fact that in many cases the finer of these sedimentary deposits have been so indurated and otherwise modified as to have put on a close resemblance to trappean masses. The latter, however, in their genuine form are, he thought, of far less frequent occurrence in this region than at first view would be inferred. He spoke of the great thickness of the Devonian and Silurian strata as developed here and in the adjoining British territories, and of the interesting field of structural geology and paleontology which they offered.

Capt. Atwood presented a specimen of a spine of the fin of some siluroid fish, which had been found deposited in the blubber of a whale killed on the west coast of Africa, in such numbers that it was with difficulty cut up; they had probably worked their way through from the stomach.

The Corresponding Secretary read the following letters, viz: —

From H. Drouet, Paris, November 9, 1859, proposing exchange of specimens; Elliott Society, Charleston, S. C., December 16, 1859, and Regents of New York University, December 31, 1859, acknowledging the receipt of the Society's publications;

from Prof. J. L. Riddell, New Orleans, January 5, 1860, and Rev. R. C. Waterston, January 10, accepting membership; from the Royal Geographical Society, London, September 9, 1859, presenting Vol. 28 of their Journal.

February 1, 1860.

Dr. C. T. Jackson, Vice-President, in the Chair.

Dr. C. F. Winslow exhibited a specimen of the so-called "cocoa-nut pearl" set in a ring, belonging to Frederic T. Bush, Esq., of Boston; Mr. Bush offered this to the Society for examination and chemical analysis. It came from Singapore; very few specimens are found; they are highly esteemed by the rajahs, and are worn like costly gems. Mr. Bush, during his residence of some years in China, saw but one other, and that was as large as the egg of a canary bird; he has heard of others as large as a cherry. The method of their growth is unknown to him from personal observation; but they are said to be found free within the cavity of the cocoa-nut. The specimen was referred to Dr. Bacon for chemical and microscopic examination, and the thanks of the Society were voted for the permission to examine it.

Mr. Bouvé said that he had seen another and a larger specimen from the same locality, some years ago, in the hands of a gentlemen who had been consul at Singapore, who also stated that they are considered rare and very precious by the natives.

Dr. B. J. Jeffries exhibited an optical apparatus suggested by Dr. Ludwig of Vienna, which introduced the general subject of vision.

Prof. Rogers thought that the physiology of vision was as yet but imperfectly understood ; vision by corresponding points of the two retinæ, for instance, cannot be maintained, though it is found in all treatises on physiology, and in most on optics.

Dr. Gould referred to the fact that though in strabismus there is distinct vision with the normal eye, the other being unused, squint-eyed persons cannot get the stereoscopic solid image, but only see a flat picture.

Prof. Rogers remarked that there is such a thing as being right-eyed and left-eyed, as well as right-handed and left-handed ; indeed many persons use but one eye for taking their direction in vision, and that is generally the right ; it is sometimes the left, but in normal instances an object is seen in the median plane between the two eyes. Many persons have the idea that stereoscopic vision is only squinting, but this is very far from being the case ; in squinting, the eyes converge to a point nearer than that of distinct vision ; in stereoscopic vision the eyes are not so directed, and the sense of fatigue and discomfort is owing to the forcible dissociation of two naturally associated actions. In common vision there are two adjustments, one consisting in directing the optic axes to the object, the other in adjusting them to suit the distance of the object from the eyes, drawing them, so to speak, out or in like the joints of a telescope ; habit enables us to effect these two adjustments instantaneously and at the same time. In looking through a stereoscope, while the object is very near, we are forced to extend our optic tubes to see an object apparently at a great distance, and thus the union of the associated motions is violently broken up, causing a sense of fatigue.

The Corresponding Secretary read the following letters, viz : —

From Dr. John Evans of Washington; Theodore N. Gill of Brooklyn, N. Y.; and Alpheus S. Packard, Jr., of Brunswick, Me.; accepting corresponding membership of the Society; — from the Royal Bavarian Academy, Munich, sending their publications: and from the Committee of the Humboldt Foundation, Berlin, asking the coöperation of the Society in the establishment of a fund for the promotion of scientific talent in works on Natural History and distant travels.

Mr. Nathaniel T. Allen of West Newton, Dr. Gustavus Hay of Boston, and Alpheus Hyatt, Jr., of Cambridge, were elected Resident Members.

February 15, 1860.

Dr. C. T. Jackson, Vice-President, in the Chair.

Prof. Agassiz made a verbal communication in opposition to the theory of Mr. Darwin, recently put forth in his work on the origin of species. Mr. Darwin he acknowledged to be one of the best naturalists of England, a laborious and successful writer; his works on the coral reefs, on the cirripeds, and his narrative of the voyage of the Beagle, show him to be a skilful and well prepared naturalist; but this great knowledge and experience had, in the present instance, been brought to the support, in his opinion, of an ingenious but fanciful theory. According to Darwin, the primary cell, by a process of differentiation and gradual improvement by natural selection, has produced all the diversities of animals, in geological and present times. He did not think it fair to compare the present fauna of the world with the fauna of any geological horizon as known in one locality; and he thought this method of comparison had led to this idea of gradual development. Animal representatives were as numerous and diversified in early geological periods as now; he instanced the brachiopods. In the lowest beds of the Potsdam sandstone we find *Lingula prima*, and allied species are found in the Silurian, Devonian, Carboniferous, Permian, and Triassic, and with occasional interruptions up to the living species; there is an unbroken succession of *lingulæ* up to the Jurassic strata; they are not found in the oölite, in the seven beds above the lias; in the lowest cretacean (neocomian) they appear again, then there is an interruption until the Tertiary epoch. About forty species of fossil *lingulæ* are found in these beds; only seven species of living *lingulæ* were known to exist until he had recently added an eighth (*L. Ravenelli*, Ag.) from South Carolina, the first found on the American side of the Atlantic basin; when the shell gapes, one valve moves over the other, a circumstance rare in the brachiopods. He thought the persistence of this form through so extensive a period, the last no more perfect than the first, was a fatal objection to the theory of gradual development.

Prof. Rogers admitted that the persistency of *lingula*, and other similar cases that might be adduced, were formidable objections to this theory; but he thought that Darwin would meet such objections by the fact that the vital characters of some animals fit them for resisting change and extinction better than more plastic natures; from our knowledge of domesticated animals we find that dogs have changed very much, and that cats have changed hardly at all; some have great energy of resistance, and some very little. He adduced several cases of interruption, like those in Bohemia illustrated by Barrande, and in middle Tennessee by Mr. Safford, which he explained by migrations to and from a given region. On the coast of Virginia and Maryland there is an extensive oyster-bed, but which has not been continuous through all time; at one time the oysters disappear, and clams make their appearance; the latter disappear, and oysters reappear; these he regarded as instances of emigration and remigrations over great spaces. Similar facts in Bohemia, embracing strata of many thousands of years' duration, show evidences of reintroduction of forms from below, colonization, and remigration. In middle Tennessee, we have the Black River limestone over the Potsdam sandstone; over this slaty limestones with Trenton fossils; after several hundred feet of thickness, this is succeeded by the Black River fossils again. He thought these evidences of migration, and not in the least degree of sudden creation without previous parents; the *lingula* hiatus suggests a similar abandonment and return of allied species in remote geological epochs. In the case of *Calymene Blumenbachii*, which extends from the lower Silurian up to the Devonian, there is a great variety of forms acknowledged to be within the limits of one species, displaying a progressive variation amounting almost to specific difference. It may also be a question whether the geological horizon of animal origin has yet been reached in our investigations. He inquired of Prof. Agassiz if any vertebrate had ever been found in strata lower than the upper Silurian.

Prof. Agassiz remarked, as to these alleged migrations, that we know that species are well circumscribed within the limits of faunæ; and that before such a line of argument can be followed, it must be shown that any species pass from one continent to another, except from man's agency. In regard to the geological horizon of animal origin, he observed that the azoic system of rocks is not so metamorphosed as not to show traces of fossils if they had existed; fragments at least would be found; yet these rocks immediately underlie the Silurian strata rich in fossils. He thought that in this lowest system of fossils there was such a coordination of the animal series as shows that all its great and principal classes were then existing. Pander has maintained the existence of fishes below the point alluded to by Prof. Rogers, from what are considered their remains; he did not distrust these conclusions of Pander, though many do. Trilobites are found in the lowest beds; these are complicated animals, and belong among the highest crustaceans; in the three other great divisions of the animal kingdom it is not the lowest, but the highest representatives that are found; the earliest fishes are among the most perfect of their class, and have many reptilian characters; the mollusks belong to the high cephalopods, and the crinoids rank high among the echinoderms. In late general works, eleven or twelve subdivisions of the earth's crust are given; D'Orbigny makes twenty-seven, but he was prepared to show the occurrence of at least forty-eight successive periods of change, with characteristic fossils found neither below nor above their respective beds; the alleged identity of fossils in different strata was only apparent, and would be found so on actual comparison of specimens.

Mr. Emerson asked what had been the antecedents to the publication of the work on the "Origin of Species." He did not quite understand the attitude of the mind of the author; he thought that the mind of an investigator into the laws of nature ought to be judicial, prepared to weigh impartially the evidence afforded by all the facts, and to let the balance incline accordingly. But Darwin comes before the reader at once as an advocate of a seemingly foregone conclusion, and argues, not for the purpose of finding in what direction the evidence of any particular fact would lead the mind, but for the purpose of finding something in the fact favorable to his preconceived opinion. Admitting the difficulties in his theory, he tries to explain them away by various suppositions and *ifs*, which by frequent repetition and consideration seem in the mind of the author to become established truths, and are used as arguments.

Prof. Rogers stated in reply that the present work of Darwin is a *résumé* of his conviction on the subject, without the presentation of the facts upon which it rests, which he has not had time to arrange. The problem is admitted to be of transcendent difficulty, and such as no observer or theorist can hope now or perhaps ever positively to resolve. Mr. Darwin makes no pretensions to an absolute demonstration, but, after an impartial survey of the facts bearing on the subject and a candid appreciation of the opposing considerations, adopts the view set forth in his book, as offering, in his opinion, a more rational and satisfactory explanation of the history of living nature than the hypothesis of innumerable successive creations. Prof. Rogers regarded the work as marked in an extraordinary degree by fairness in the statement of opposing as well as favorable arguments, by the absence of dogmatism, and by all other evidences of a truth-loving spirit, as well as by the extent and variety of its knowledge and the breadth of its philosophical views.

As regards the statement that the most ancient types of life were higher or more perfect than recent ones, he had always considered Prof. Agassiz as maintaining that these earlier forms were of an embryonic character; and in this connection he remarked that the term "perfection" is just as indefinite as the word "species." He considered perfection as specialization in each type; if an animal approach nearer perfection because, for instance, it be part fish and part reptile, or if a structure part animal and part vegetable be more perfect than the plant, then is the cell the type of perfection, combining as it does properties belonging to both kingdoms; he considered perfection, not the union of different types, but specialization in each particular type.

Prof. Agassiz considered perfection to mean an embodiment of the highest combinations, the most complex representation of life. The embryo fish presents features of its type superior to those of the adult fish; the tendency to specialization increases with its growth, and the animal at last becomes only a fish, losing its embryonic type of the higher vertebrates. As a generalization or philosophic conception, the vertebrate egg is superior to man himself, inasmuch as it embodies all that may be produced from it.

Mr. Scudder presented by title a description of *Hoplocampa rubi* by the late Dr. T. W. Harris, with remarks on its history by Noyes Darling, Esq., in letters to the same, as follows: —

Family TENTHREDINIDÆ.

Genus *Selandria*, (Leach.)

Sub-genus *Hoplocampa*, (Hartig.)

Selandria (*H.*) *rubi* (Harris).* Black; a spot on each side of the collar, middle of the dorsum, and legs, dirty yellow; hindmost tarsi dusky; wings smoky. Length of the body nearly one fifth, expansion of wings one half of an inch.

Larva, green: 6 dorsal rows of tubercles bearing 2 black bristles, and 4 lateral rows on each side bearing white bristles; most of these tubercles have 2 bristles, some have 3, and the anterior ones of the first segment have 4 or 5 each, — the tubercles alternate in the rows. Each segment, therefore, has 14 setigerous tubercles; along the lower margin of the body are a few more single bristles, or short tubercles, irregularly placed. Bristles not barbed, $\frac{7}{20}$th of an inch in length.

* See Address upon Injurious Insects, by Noyes Darling, p. 13. New Haven, 1845. New England Farmer, i., p. 164, 1849; ii., p. 33, 1850.

The imago is found resting on the upper side of the leaves of the raspberry, which this insect attacks. When the leaf is touched the insect falls as if dead, but in two or three seconds takes wing. It is very easily caught.

The eggs seem to be placed between the coats of the leaf, by the side of the ribs, and, as they increase in size, produce an oval expansion of the under coat, and a discoloration of the cuticle of the upper side, directly over the egg.

The larva appears early in May, on leaves that have a warm exposure and are near the ground. It leaves the bush about the time the fruit ripens, goes into the ground, forms around itself an oval coat of earth cemented together, and remains till spring. Larva taken at Cambridge, full grown, June 19, 1846.

Dr. C. F. Winslow presented some freshwater fishes, crustaceans, and mollusks from the Sandwich Islands; the first two were taken in the river Wailukee, in the mountains of West Maui, seven or eight miles from its mouth, and more than 1,000 feet above the sea; they are found in the midst of the most violent rapids; the fish are said by the natives not to be found near the sea. The shells were taken from a ditch connecting the river with the taro patches of the valley, three or four miles from the sea; collected in June.

Dr. Bernstein, of Java, E. Indies, and Edward Norton, Esq., of Albany, were chosen Corresponding Members; George N. Briggs of Auburndale, and Edward W. Codman of Boston, Resident Members.

March 7, 1860.

Dr. C. T. Jackson, Vice-President, in the Chair.

Mr. C. H. Hitchcock exhibited a geological map of Vermont, and explained the principal features of the complicated geology of that State.

The two most interesting points in this connection were, that there is no foundation for what Mr. Emmons called his Taconic system, (a mixture of the Silurian and Devonian,) and that the Dorset limestone (his Stockbridge limestone) is newer than the lower Silurian, and is probably upper Silurian or Devonian.

Prof. W. B. Rogers remarked upon the importance of the investigations referred to by Mr. Hitchcock, and spoke of the difficulty which the geologist has to encounter in attempting to ascertain the precise sequence of the rocks in a region where, as in the greater part of Vermont, perplexing structural features, metamorphic influences, and an extreme paucity of fossils combine to embarrass his inquiries. It is not therefore matter of surprise that, in spite of repeated explorations, some important problems in the geology of the State should still remain unresolved.

As regards the belt of formations on the western side of the State, extending along the shore of Lake Champlain, the abundance of fossils and the almost undisturbed position of the strata have rendered their investigation comparatively easy, so that these formations were early identified with the lower members of the paleozoic series, from the Potsdam sandstone to the Hudson River group inclusive. Immediately eastward of this narrow strip is another belt of variable breadth, extending through more than half the length of the State, and passing northward into Canada. This consists of reddish sandstones and shales, and reddish, white, and gray limestones, which, from lithological peculiarities and the absence of distinct fossils, were much less easily referred to their proper geological position. Indeed it is only within a few years that this remarkable group of strata has been generally recognized as belonging to the period of the Oneida and Medina rocks, to which Mr. Hitchcock now refers them.

As connected with the history of this investigation, Prof. Rogers felt some satisfaction in stating that in a paper entitled "Notes on the Geological Structure of Western Vermont, &c.," communicated by him to the American Association at Albany in 1851, the manuscript of which he now submitted, he gave a detailed account of numerous sections and longitudinal tracings made during preceding seasons, and in express terms announced the conclusion that the rocks in question were referable to the Levant, or in other words the Medina period. As, however, the chief interest of the discussions arising on the occasion had reference to the supposed Taconic system of Prof. Emmons, to which Prof. Rogers's observations had been largely directed, his statement of the age of the red rocks and associated limestones excited comparatively little attention at the time, although he believes it was the first distinct announcement of the conclusion regarding the geology of this belt which is now generally received. He however thinks that Prof. Hall mentioned at the time having arrived at a similar result. As this paper was not published in the Transactions of the Association, but only mentioned by its title, Prof. Rogers asked to be allowed to insert in the Proceedings of the Natural History Society an extract setting forth the conclusion and the arguments on which it was founded. The extract, beginning with an account of the rocks on the eastern slope of the Snake and Buck Mountains, is as follows: —

"The general geological position of the red rocks here spoken of is clearly seen by following either of the sections from the western base of the Snake and Buck Mountain across the trough or valley above described. Here we ascend through the various divisions of the Matinal series from the Trenton to the top of the Hudson River group as here defined, each marked by characteristic fossils, and all maintaining a nearly uniform eastern dip; and above the latter we find a series of red and greenish and gray sandstones and shales of great thickness, succeeded, where the exposures are unbroken, by arenaceous and argillaceous reddish and gray limestones, alternating with beds of sandstone similar to that beneath."

"Stratigraphically considered, this series of beds occupies the position of the Medina group of New York, or its equivalent the Levant series of Pennsylvania and Virginia. The sandstones and shales bear a close resemblance to those of the latter, not only in color, but in the profusion of fucoid-like markings which they display on some of the parting surfaces. The series of reddish and gray limestones which rest upon these massive arenaceous beds form an interesting feature in the geology of Vermont. Their alternation with layers of sandstone and shale, and their frequently reddish tint, would lead us to regard them as a continuation of the lower mass under somewhat new formative conditions. In the prolongation of this belt of sandstones and limestones toward the north, as at Winooski Falls, near Burlington, the latter mass is seen to consist in great part of a pinkish white fine-grained limestone, which toward the base contains layers of reddish limestone interstratified with red sandstone, — marking the transition from the arenaceous to the calcareous form of deposit."

"In none of the localities of this calcareous mass which I have examined, from the flank of the Snake Mountain to near the Canada line, have I found any well-marked organic remains. This fact of itself strongly favors the idea of its being but a peculiar development of the upper portion of the Medina group. Nor can it be objected to this that metamorphic action may have caused its present destitution of fossils. Throughout nearly the whole of the series of exposures extending due north toward the Canada line, it presents a gentle eastern dip, conforming to the subjacent fossiliferous beds of Matinal limestone and slate, from which it is separated only by the sandstones above described. From this we infer that it must have been as little exposed as these fossiliferous beds to agencies capable of obliterating its included fossils, and that therefore it has never been in any considerable degree a fossiliferous mass."

"We are further strengthened in the opinion that this calcareous group, with the subjacent sandstone, belongs to the Medina period, by the consideration that the Clinton group, with which it might otherwise be compared, is almost everywhere an eminently fossiliferous one. From Alabama to northern New York, it is marked by an abundance of fossils. According to Mr. Logan, strata of this age are found in the vicinity of Lake Memphremagog, and, although there surrounded by metamorphic masses, they include a number of fossils in good preservation."

"On the whole, therefore, I think that the limestone and subjacent sandstone of which we are now treating must be regarded as one formation, and may with the highest probability be referred to the period of the Levant rocks or the Medina group of New York."

Dr. White exhibited a section of the tusk of an elephant, formerly presented, as an example of the growth of *osteo-dentine.*

The tusk of the elephant is composed of a thin outer layer of enamel, and the peculiar modification of dentine known as ivory, characterized by the minute size and remarkable curvatures of its tubes. The tooth grows in length by continual deposition, from the cone of matrix within its base, of the enamel and dentine; occasionally, however, in old animals a thin deposit of nodules of *osteo-dentine* is found within this cavity, the last effort of the dentinal pulp. Injury appears to produce the same result, as was seen in the specimen, which illustrated the effect of the passage of a large wrought-iron musket-ball through the dentinal pulp from side to side. The ball entered probably the thin socket formed by the prolongation of the premaxillary bone, breaking through the thin wall of the tusk, through the tender pulpy cone, and the tooth wall of the other side, and spent its force against the interior surface of the socket on the opposite side; it then fell back within the soft hollow it had formed, and became imbedded in the new growth it excited. In time it was undoubtedly carried forward by the growth from the base, until it perhaps cleared the socket. He inferred that the wound was thus made, on account of the large cavity still unfilled by deposition of tooth-matter from the pulp. The course of the ball was marked by a hollow cylinder of *osteo-dentine* deposited about its track; the inner layer of ivory was driven in by the force of the ball, and the efforts of the matrix never recovered their normal direction, for not only was its secretion deposited in irregular layers and masses, but its nature was perverted, and *osteo-dentine,* instead of ivory, was ever afterward its product.

Prof. W. B. Rogers explained the laws of fracture of a thick glass tube, exhibited by U. A. Boyden, Esq.

A thin tube would fracture in a spiral manner, the result of the circular and longitudinal tendencies to break; in a thick tube, there is a third tendency to fracture from the centre to the periphery; if this be combined with the other two, the resultant is the imbricated fracture observed in the specimen.

Prof. Agassiz made a communication on consecutive faunæ and their corresponding number of geological formations, as furnishing arguments against the theory of Darwin.

He believed that the number was considerably greater than had been hitherto admitted. He objected to the use made of the great and well-known changes in animals under the influence of domestication, as an argument in favor of similar probable changes in geological ages; the genera of these domesticated animals, as *bos*, *canis*, &c., lived ages before the human period, but their remains show no such changes as now occur; these are two distinct series of facts, and are not comparable. The representatives of these faunæ differ specifically, and do not pass from one to the other, and this is true from the most ancient to the most recent periods. He defined faunæ as groups of animals enclosed within circumscribed areas; there are many of these on the globe, and they must not be confounded with zoölogical realms; of the latter, New Holland may be mentioned as an example, having animals of a peculiar type; so are the East Indies, Africa south of the Atlas Mountains, America from the sub-arctic regions to Patagonia, and the arctic regions themselves. Faunæ, on the other hand, occupy more limited provinces characterized by species related to each other, as they are more largely in realms. Faunæ differ in various parts of the world, and no one can be taken as a type of existing creation; for instance, the fauna of Canada differs entirely from that of Africa, and any zoölogist who should take one or the other or any single fauna as the type of the world's animals would commit an absurdity; yet geologists do this constantly in their identifications of geological periods, and of course fall into the gravest errors. He found fault with the methods of determining the limits of successive faunæ usually pursued by geologists; he thought that this order should be determined by the fossils; that the rocks should be regarded merely as the tombs of the fossils, that naturalists should try to find out the animals of an epoch, and establish the limits of faunæ on zoölogical and not on physical principles. He made use of the strata of New York State, as being well ascertained, in his determinations of the primary groups of faunæ. The lower and upper Silurian and the Devonian he divided into several faunæ, according to Prof. Hall, many of which he had satisfied himself from examination of their fossils were distinct; these answered, as a general rule, to the subdivisions or groups adopted by Profs. H. D. and W. B. Rogers in their "Geology of Pennsylvania and Virginia;" the faunæ of the Devonian he had not as yet been able to determine; he would characterize the primary up to the carboniferous as being composed of exclusively marine faunæ, as the age of fishes.

In the carboniferous age marshy land appeared, the beginning of continental lands with inland waters. In the tertiary, according to Mr. Lyell, 4 or 5 per cent. of the eocene species pass on to the present period, 19 per cent. in the miocene, and about one half in the pliocene; this he regarded as an error which would not have been committed with a sound zoölogist by his side. He instanced *Rostellaria fissurella*, which had been considered identical in several formations, as being easily recognized to embrace distinct species on actual comparison of the specimens. He objected to Deshayes's principle of requiring equal and great differences in the determination of species, as what would constitute a specific difference in one case might be far greater than that required in another. The mastodon and *Elephas primigenius* are acknowledged to be extinct, and he saw no reason why other classes in the animal kingdom should not be exterminated by the same causes; he was convinced that careful examination would show that the lowest mollusks in the tertiary beds are as different from the present as are the larger animals.

Prof. Rogers replied that the entire severance of these faunæ must be demonstrated, before such a line of reasoning can be employed against the theory of Darwin; if such a distinction be true, we must abandon nearly all the hitherto accepted specific determinations of other accomplished zoölogists, most of whom maintain that animal forms do pass from one stratum to another. The division lines, moreover, are essentially local; the number of species said to pass from one formation to another may be so great in some localities as entirely to obliterate divisions which in other and not very remote places are marked by very sharp transitions. Thus in New York, out of more than seventy forms found in the strata below the upper limit of the Black River limestone, only three have been observed by Prof. Hall to pass up into the overlying Trenton limestone, and on the same horizon a transition almost as abrupt shows itself in parts of Pennsylvania and Virginia. Here then we would seem to be justified in drawing a strong line of separation between the contiguous Black River and Trenton faunæ. But turning to Canada, we find a very different distribution of the fossils. In this region the Black River limestone, that is, the rock containing the characteristic Black River fossils, includes a preponderating number of species found also in the Trenton. According to the Canada paleontologists, fifty-two out of seventy-five are common to both formations, and what is still more interesting, some Trenton species are found in the yet lower group of the Chazy. Here obviously we can no longer draw a limit between the Black River and Trenton faunæ, but must blend them gradationally into one.

A yet more striking instance of the essentially local nature of these lines of demarcation is seen in the corresponding group of formations in Tennessee, where, according to Prof. Safford, the upper Lebanon rocks are more strongly marked with a Black River fauna than the lower, thus in a measure *inverting* the succession of the fossil groups as compared with New York, and putting the Trenton fauna below a group which in New York would be called Black River.

So again in the passage from the Hudson River group to the overlying rocks, marked in New York and over much of the Appalachian area by evidences of great mechanical disturbance, we find the line of demarcation so strongly drawn that only a few species are continued into the next superior formations. This, therefore, has been well recognized as one of the most abrupt of all the transitions in our paleozoic geology; and yet toward the northeast, in Anticosti, where these evidences of physical movement are comparatively slight, we see the conglomerates and sandstones of the intermediate Levant or Oneida and Medina group replaced by limestones, forming beds of passage which contain some of the characteristic fossils of both the lower or Hudson River formation and the superior or Clinton group. Here, therefore, the lines of separation become so vague or so nearly obliterated as to make the proposed limitation of faunæ quite impossible.

Seeing, then, that faunæ are not unfrequently mingled in contiguous formations, that they do not hold the same precise geological level or vertical distribution at different localities, that they may even become inverted in relation to each other, offering in this and other cases evidence of emigration and remigration in successive times, Prof. Rogers maintained that the *precise and absolute limitation* of faunæ to formations, as advocated by Prof. Agassiz, if true in any case, is at best but of local and partial application, and can not be the basis of a paleontological arrangement of formations. Even according to the ordinary and much less stringent view of geological faunæ, it is found that only the few great divisional lines of the geological column are persistent over extensive areas, while the numerous subordinate ones, however distinct at the typical locality, lose themselves as they are traced, to give place to other modes of subdivision.

As regards the comparison of the tertiary fossils with corresponding modern forms, Prof. Rogers said that we had the authority of Say, Conrad, Deshayes, and indeed paleontologists in general, for the conclusion that a large number of the fossils found in the tertiary deposits are identical with existing species. Even supposing, however, that the fauna of the tertiary contains no such identical forms, it will be admitted that the likeness becomes extremely close as we approach the modern epoch, and this would seem to lend support to Mr. Darwin's doctrine of modification by natural selection. In regard to the discrimination of species, the question at last must come to this: What is the limit of specific difference? who shall be the arbiter? what the principle of distinction between species and variety, and what the guide in drawing the lines of demarcation of the successive faunæ?

Prof. Agassiz remarked that he did not expect the immediate reception of his views, though convinced that they were true, but believed that after mature examination of his facts they would be generally received. He mentioned the fossils of the Jura as an instance of the great change in the views on such subjects; according to Goldfuss, they are identical throughout the whole series, but they are now admitted to be different. He did not think that the increasing acknowledged differences point in any way to a gradation of species or to a confusion of animal forms, but rather enable the naturalist to distinguish clearly his species. He alluded to chemistry, in which there was a time when platinum and other silver-like metals were not distinguished from silver; but in the progress of science they were ascertained to be separate and distinct species.

Prof. Rogers replied that this argument would answer equally well for the other side of the question; for instance, chemistry has reduced to one many supposed different species, as the diamond, plumbago, and carbon.

Dr. Bryant placed upon the table forty specimens of Brazilian birds mounted by himself, about half of them new to the cabinet, and some of them rare; from the collection presented by Dr. J. C. Reinhardt.

A letter from Mr. Charles W. Holman, requesting the Proceedings of the Society for the library at Westeras, Sweden, was referred to the Publishing Committee.

Mr. Charles F. Eschweiler, of Houghton, Michigan, was chosen a Corresponding Member, and Dr. George Russell, of Boston, a Resident Member.

March 21, 1860.

The President in the Chair.

Mr. Whittemore read a communication from Mr. James Lewis, of Mohawk, N. Y., on the colors of the nacre of freshwater bivalves.

In some sections of the country the nacre, ordinarily white, is colored, especially in the *Unios;* from experiments made on shells, he is inclined to believe that a minute trace of gold in the water may in some way be connected with the rich colors of the nacre of some *Unios.*

He also sent an account of some experiments on a new registering thermometer, in constructing which he prepared a bundle of rods of iron and brass wire (No. 13), equivalent to 45.8 inches of brass wire, antagonized by 45.8 inches of iron wire, on the principle of the compensated pendulum ; these, connected with a series of levers and a dial for inspection, and a registering point, moving on parallel rods, actuated by clock-work, constitute the apparatus. The rates of expansion of brass and iron, as ascertained by his apparatus, do not agree with the rates given in the Reports of the U. S. Coast Survey. This opens the way to the suspicion that some of the "base lines" of the Coast Survey contain errors larger than may heretofore have been looked for. He graduated his dial according to the rates derived for the Reports, 93° for the whole circle ; he found, in practice, that to agree with a mercurial thermometer his circle (dial) should read 120°. His communication was referred to Prof. Rogers to report upon.

Prof. W. B. Rogers explained his views of the stratigraphical relations of deposits formed in an ocean, under each of the three conditions of a *stationary*, a *subsiding*, and a *rising* position of the sea-bottom, illustrating the several results by drawings on the blackboard.

In the first and second of the conditions here named, the level of the resulting land would be *approximately horizontal ;* while in the third case, that of the uplifting of the ocean-floor during the accumulation of the deposits, the surface would present a slope descending from the oldest deposits on the first shore-line to the strata latest formed ; in other words, the *older deposits* would crop out at the *higher level*, and the successively later ones at a less and less elevation.

The Appalachian strata embraced between Lake Ontario and the Pennsylvania coal region present a relation of levels *the reverse of that last named*, the older strata cropping out at successively lower levels as we proceed northward, while the newer formations, the Devonian and Carboniferous rocks on the south, are piled up to a height of some thousands of feet above the level of these outcrops. For this and other reasons, Prof. Rogers could not admit the theory which regarded the present stratigraphical features of this region as evidence of a deposition of the strata during a long-continued upward movement of the ancient sea-floor.

Another consideration opposed to this view is the *great aggregate thickness* of the marine deposits exhibited in the middle and southern portion of the Appalachian area, and the known fact that even the older and lower of these formations, where brought to view by anticlinal structures, present a composition and surface-markings bespeaking a comparatively shallow ocean at the time of their accumulation. As, therefore, the ancient sea of this region could have had no great depth at the commencement of these deposits, it seems clear that, in order to receive the whole series of more than twenty thousand feet of successive strata, its original floor, instead of rising during this period, must have undergone *an enormous amount of depression.*

Looking to the series of carboniferous rocks forming the upper portion of this vast succession of deposits in our Appalachian basin, the evidences of such a subsiding movement are too obvious to be questioned. Each of the nearly horizontal beds of vegetable matter forming an incipient coal-seam must have been deposited at or a little above the ancient sea-level, and must then have been depressed and covered in by sediments forming the sandstones and shales, often with marine fossils, which now overlie it. Thus, stage by stage, with long pauses, in which the materials of successively newer coal-seams were accumulating by vegetable growth, the sea-bed was depressed until it had received the entire thickness of the carboniferous rocks, with their included strata of coal.

On either hypothesis, that of a subsiding or of a rising ocean-bottom, the features of the land, as first presented on the completion of its formation, would be far from corresponding with its present topography. This existing configuration has undoubtedly been the work of subsequent denudation, of which extensive and unmistakable evidences are apparent throughout the paleozoic area. The theory of an uplifting movement during the deposition does not, as has been supposed, dispense with the necessity of such a further agency for remodelling the surface. On the contrary, in this case, the depth of denudation required to carve out the profile of the region in question, so as to make it conform to the existing features, would be far greater than would be needed to bring the imaginary subsidence-area to a like agreement. In the latter conditions, the denuding force would be called on to remove only a certain amount of material below the horizontal surface over the northern portion of the tract; in the former, it would have first to cut down the greatly elevated outcrops at the north to bring them on a level with the southern deposits, and after this to do an additional amount of excavation equal to that of the other surface.

Admitting the validity of these arguments drawn from obvious mechanical and stratigraphical relations, we must conclude that the remarkable preservation of the paleozoic strata in the region referred to has been due to the subsidence which successively removed them in great part from the destructive effect of shore-action, sealing them down under an accumulation of overlying deposits. This preservation, therefore, is entirely consistent with the view of Darwin and other geologists, of the extensive destruction of deposits with their fossils, when, through an *uprising movement*, they are brought, stratum by stratum, within reach of the wasting and dispersing forces of the shore. It certainly affords no argument in contravention of that doctrine.

In maintaining that these paleozoic rocks were accumulated during a period characterized, on the whole, by a great aggregate subsidence of the ocean-floor, Prof. Rogers was far from supposing this movement to have been regular, or without pauses and reversals. He believed that the materials of the successive great formations bear intrinsic evidence of repeated *long pauses*, and that the transitional deposits are marked by the proofs of occasional, and perhaps frequent, *upward oscillation*. During these subordinate pauses and upward movements, themselves occupying periods of great absolute length, however small in comparison with the whole, we may well conceive that many extensive sheets of the previous deposits were disintegrated and dispersed, and we may fairly infer that the existing series of strata, with all their seeming fulness, are but an imperfect and fragmentary record of the life-history with which they are impressed.

Prof. Agassiz maintained that there was not subsidence during the deposition of the New York strata, and that the facts do not indicate it, but rather an upheaval. Before the Potsdam sandstone there is no evidence of high mountains. During upheaval, there is dislocation at the junction of the beds, forming a series of abrupt vertical cliffs, as seen in the succession of the strata of New York; in the case of denudation, the surface would be a series of general curves, which is not the case in New York. During upheaval the level of the sea may be actually less, from the contraction of the earth's crust while cooling; in consequence of this contraction the ocean would always remain at a certain depth, sufficient for these depositions of thousands of feet of strata during the upheaval of the land. The study of the fossils, also, is opposed to the theory of subsidence and denudation, and we do not find those of the primary carried into the secondary beds.

Prof. Rogers replied that the subsidence of the ocean-bottom is equivalent to an increase between the bottom and the level of the sea; when this distance is increasing, the deposits are thereby sealed in by the subsequent deposits; when this distance is lessening, thereby successively exposing all the margins of the strata to the action of the surf, they are worn down and destroyed. The change of relative distance is the important point; how this is brought about is of little consequence to the present discussion. The perfect conformity and parallelism of the bank-like strata adverted to by Prof. Agassiz, and the terrace form, depend on the dip of the strata, and on the planes of cleavage being nearly perpendicular to the stratification; and the present aspect of these surfaces is continually changing.

Prof. Agassiz replied that, though of course these terraces have undergone great changes, he meant to convey the idea that they represented, to all intents and purposes, the original surface of the country.

Dr. Hayes submitted a letter from the interior of Liberia, Africa, in which the writer says that there is no occurrence there of native iron, as stated by him in Vols. V. p. 250, and VI. p. 279, of the Proceedings.

The piece there described was smelted by the tribe among whom the writer resided, who keep the art to themselves, as they find the manufacture of iron very profitable, the product of their furnaces being held in high esteem by the neighboring tribes, as a tougher and more flexible iron than they can obtain from foreign countries. The furnaces consist of stacks of about six by five feet, and about seven feet high, with a flue in the centre about two feet long by nine or ten inches wide; the flue, passing to the bottom of the stack, is filled with layers of coal and ore, upon which they force a strong current of air by rude contrivances; nothing is allowed to escape but the dross, and a heavier brittle substance which they remelt in small furnaces; the iron is left to cool in the furnace, which gives it the appearance of ore, with large particles of dross adhering to it, much blistered in places, with very rough protuberances over much of its surface. Many of these furnaces, with their banks of dross, may be seen in the interior of the country. The color of the ore, mostly of mountain character, is between cherry and brownish red, like red iron-stone. He had seen pieces of fifty or sixty pounds, the result of one blast. They cut the mass when heated with their rude axes as they do wood, showing the good quality of the article. The ore is plentiful in most parts of the country, and of varying quality. The masses of iron are in many places sold as they come from the furnace, but in the interior it is forged into pieces resembling a "pudding-stick," which are used as a medium of exchange in commercial transactions in the markets and in private barter. Africa has doubtless all the iron required for her extensive wants, and dense forests for the manufacture of the coal to work it. Dr. Hayes wished, therefore, to correct the error in the statement that native iron exists in Africa, to which he had been led by its texture and chemical composition, which were unlike those of manufactured iron in containing quartz crystals and magnetic oxide of iron, with no traces of carbon or its compounds.

Prof. Agassiz continued his remarks on the subject of successive faunæ, of which he considered there were more than fifty, capable of as satisfactory proof in geological periods as at the present day, and at least ten more indicated.

His object at the present time was not to explain the origin and connection of faunæ; we must take them as we find them, as matters of fact, without reference now as to how they were produced. It is important in the discussion of this subject to bear in mind that some faunæ are strictly defined, while others run together; there is very great difference in this respect; Mr. Wallace, a strong advocate of Darwin's theory, admits the remarkable limitation between the Australian and Indian Archipelago faunæ, separated by a strait only fifteen miles wide, yet, with the exception of a few birds, entirely distinct. Faunæ are not necessarily, therefore, like each other because near together, nor unlike because widely separated; the former is shown by the case just cited, in which there is complete distinction, though circumstances favor a mingling of faunæ; on the other hand, those of widely distant Africa and the east coast of America between the tropics are very much alike. These do not look like migrations, which are at best limited, and in which, if the conditions of life were much changed, the animals would be destroyed; marine animals, in an element which invites migration, are very much circumscribed within limits as to depth of water, and could not migrate from one part of the world to another across ocean abysses. Another obstacle in the way of migration is the transfer of progeny; eggs in most animals cannot bear much change of temperature or of location, without destruction of the contained embryo. He would pursue a strictly zoölogical method, as in the comparison of living animals. Without discrediting the researches of others, he would simply examine their materials anew, with a new object in view; the usual investigations are too general and unsatisfactory, and their results not precise enough for use in the question of the origin and limits of species; the materials were not accumulated for this purpose, but for zoölogical questions in which identity, overlooking slight differences in species, might be assumed without leading to grave errors, and without sufficient examination. For instance, the animals of Europe and America, once considered identical, are now admitted to be different species on direct comparison. This is a purely zoölogical question; the older geological divisions are not coincident with zoölogical divisions and faunæ. In the carboniferous age, reptiles were the highest vertebrates. As to the limit between reptiles and fishes, whether before or after the coal, by examination of the floras, and finding the Permian resembling the carboniferous, he would place the limit between the carboniferous and the Devonian at the old red sandstone; with the tertiary came in the reign of mammals, the marsupials having come in during the oölite.

In the number of species which he has used to characterize a distinct fauna, he has always taken into account the previously ascertained abundance of any fossils under consideration in other geological periods, and whether the family were in the ascendency or on the decrease at the period examined; without the elimination of errors which might arise from these sources, any observations would be of little value. In his mode of determining or identifying species, he always ascertains, if possible, whether they belong to a genus in which the species vary little or much, (as in the herrings in the former case, and the percoids in the latter,) and whether to a genus in which there are or are not great differences in size.

In regard to the vitality of eggs, the President remarked that it is well known that the eggs of salmon and trout are sent by *diligence* all over France; and Prof. Rogers observed that the flight of most birds would enable them to multiply on both sides of a narrow strait like that alluded to.

Mr. Theodore Lyman presented the following descriptions of new *Ophiuridæ*, belonging to the Smithsonian Institution and to the Museum of Comparative Zoölogy at Cambridge.

Ophiothrix, (Müll. & Trosch.)

Ophiothrix dumosa, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 11.5 millim. Length of arm, 72 millim. Teeth 6, cutting edge a little rounded; squarish, thick; sometimes split in two; upper one rather narrower and more tapering. Tooth-papillæ about 38, arranged in two diverging, principal rows, between which are included some smaller ones; these two rows are vertical, and start, just below the teeth, with a pair of stout papillæ, like a tooth split in two. Mouth-shields oval heart-shaped, with a decided peak inward; length to breadth, 1.3 : 1.8. Side mouth-shields rather narrower than is common in the genus; meeting within. Under arm-plates much broader than long, hexagonal, with angles more or less rounded; first four plates smaller than those beyond, and much more rounded; most of the plates on the first third of the arm are hexagonal, with pretty acute angles; their outer side sometimes a little reënteringly curved; length to breadth, (12th plate,) .7 : 1.2. Upper arm-plates diamond-shaped, with inner angle truncated; lateral ones usually acute, and outer one more or less rounded; on the median line a ridge. Length to breadth, (5th plate,) .7 : 1.3. Brachial and inter-brachial rays of disc closely beset with stout spines of several sizes, most of them long: the longest, 1.7 millim., the shortest, .3 millim. There seem to be no such short spines, bearing a crown of slender thorns and remaining permanently small, as in *O. spiculata*, but the smaller spines seem only partly-grown large ones; the largest are stout and round, and have rows of five or six thorns on their sides; they usually end in three blunt thorns; the smaller ones are usually very thick at the base, but above the first thorn grow suddenly smaller, and taper to a somewhat blunt, thorny end; they have rows of three or four thorns on their sides; the smallest spines are little stout cylinders, ending in a conical clump of nine or ten short thorns; rarely this clump has an even top, and not more than six thorns. Radial shields nearly bare, with only a few spines on their sides and inner ends; outer ends touching each other; length to breadth, 3.2 : 1.6. Spines on interbrachial spaces below more slender and scattered, not extending quite to the mouth-shields. Arm-spines rounded and stout at their base, tapering regularly to a blunt point; but little flattened; ending in a crown of short, blunt thorns; 13th joint, 8 spines; lengths to that of under arm-plate, 3.5, 2.2, 2.5, 2.5, 1.8, 1.5, 1, .6 : .7. Upper spine always longest and stoutest, with rows of about twenty-four small thorns on its sides; it sometimes attains a length of 4.5 millim. Tentacle-scales usually much larger than are commonly found in the genus. Color, in alcohol: above, disc dull cobalt blue, approaching lead color; radial shields lighter, with several large dark spots; upper arm-plates pale bluish, with a darker spot on each side; arm-spines dark at tips; below, interbrachial spaces similar to upper surface;

mouth-shields and under arm-plates irregularly edged and spotted with dark blue.

Variations. Another specimen had but few of the longest spines on the disc, most of them being of the second or of the smallest size; the radial shields had no distinct spots, and the under arm-plates were mostly bright blue. The side mouth-shields sometimes do not meet within.

This species differs from *O. spiculata*, *O. violacea*, and *O. angulata* in the armature of the disc, which is coarser and of a different character; the two latter species, also, are smaller.

San Diego, Cal. Mr. Cassidy.

Smithsonian Institution, No. 1049.

Ophiothrix magnifica, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 12.5 millim. Length of arm, 70 millim. Tooth-papillæ about 36, in two vertical, diverging rows of about 10 papillæ each, filled in between with smaller papillæ. Teeth 6, with a squarish cutting edge; rather thick; uppermost one thinner, and tapering almost to a sharp point. Mouth-shields small, almost circular; length to breadth, 1 : 1.2. Side mouth-shields meeting within. Under arm-plates irregular oval; closely joined to each other, and covered with thick skin, so that their outlines are indistinct; length to breadth, .7 : 1.3. Upper arm-plates small, with a strong median ridge; diamond-shaped, with the outer angle strongly rounded; length to breadth, (13th plate,) .7 : 1.2. Brachial and interbrachial rays closely beset with round, stout, tapering spines, of very even length; they are covered with minute thorns, and terminate in a crown of the same; these spines have usually a length of 1.3 millim. Radial shields bearing only a few small spines; length to breadth, 3.5 : 1.7. Arm-spines stout, rather blunt, rounded, slightly and regularly tapering, bearing many small thorns, and deeply corrugated lengthwise; second and third spines usually longest and stoutest; 11th joint, 8 spines; lengths to that of under arm-plate, 2.4, 2.6, 3.1, 2.1, 2.1, 1.5, .9, .5 : .7. Tentacle-scales distinct, flat, rounded at their outer end. Color, in alcohol: above, disc dull indigo blue; arms the same, but banded with lighter, usually two or three joints to each band; arm-spines faint blue; below, under arm-plates variegated with cross-lines and specks of white and darker and lighter blue, giving the arm a banded appearance.

Variations. The general color may incline more to greenish blue, or to purplish blue; and the markings of the under arm-plates may form more or less distinct bands. The largest specimen had a disc of 14 millim., and some of the spines on the disc were as long as 2.1 millim. Many of the arm-spines were tipped with white.

This very beautiful *Ophiothrix* belongs to the group which has only long spines on the back of the disc; these are shorter and stouter than in *O. Örstedii* or *O. Suensonii*, both of which, moreover, are smaller species.

Peru. C. H. Raymond.

Smithsonian Institution, No. 1043.

OPHIURA, (Lamk. non Forbes.)

Ophiura Holmesii, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 19.2 millim. Length of arm, about 74 millim. Mouth-papillæ 16 to 18; outermost one largest; next one to outermost broad and flat; the rest rounded, tapering, pointed. Teeth 4, uppermost one longest and sharpest; the others thin and flat, with a rounded cutting edge. Mouth-shields long heart-shaped, the point inward; a slight indentation on outer edge; length to breadth, 1.8 : 1.6. Side mouth-shields small, thickened, rounded triangular. Under arm-plates squarish; outer side curved, lateral sides a little reënteringly curved, inner side and inner laterals of about equal length, and lying nearly in one line; further out on the arm the plates are more octagonal; length to breadth, (5th plate,) 1.2 : 1.6. Upper arm-plates much broader than long; inner side a little shorter than outer; length to breadth, (4th plate,) 1.2 : 3.2. Granulation of disc pretty close and regular, about 180 grains to a square millim. Scales at the bases of the arms completely covered by granulation. Arm-spines stout, flattened, somewhat rounded, varying little in size; upper ones sometimes a little the longest; 8th joint, 9 spines; lengths of uppermost and lowest to that of lower arm-plate, .8, .8 : 1.2. Tentacle-scales as usual in the genus. Color, in alcohol: disc, above, with a dirty white patch in the centre; rest of upper surface having a ground tint of light, yellowish brown, slightly clouded with olive; arms, above, dirty white, irregularly barred with yellowish brown, each bar usually including two or three joints; lower surface of disc and of arms uniform dirty white, with a brown tint just on edges of disc.

Variations. According to drawings in possession of Prof. Agassiz, the color is almost as variable as in *O. appressa.* A common pattern is a dark green disc with a blotch of white in the centre, and arms banded with darker and lighter green. Specimens with a disc of 14 millim. have the lower arm-plates proportionately longer and more octagonal.

This species resembles both *O. brevispina* and *O. olivacea,* but is larger than either, 20 millim. being about an average for the disc of an adult; it is further distinguished from the former by stouter arms and the different proportions of the lower arm-plates, and from the latter by barred arms and varied coloration.

Charleston, South Carolina. Prof. Agassiz and Prof. F. S. Holmes.

Museum of Comparative Zoölogy, Cambridge.

Ophiocoma, (Agas.)

Ophiocoma Alexandri, (Lyman.)

Description of a Specimen. Diameter of disc, 17 millim. Length of arm, 120 millim. Mouth-papillæ flat, rounded, of nearly equal size, rather small; 9 or 10 to each angle of mouth. Tooth-papillæ about 9, crowded, bead-like, most of them in two vertical rows. Teeth 3 or 4, stout, flat, a little tapering. Mouth-shields nearly round, with inner end slightly truncated; length to breadth, 1.6 : 1.6. Side mouth-shields very narrow and small, occupying the inner portion of the mouth-shield, but not meeting within. Under arm-plates very regular; not overlapping; rounded octagonal; inner angles less rounded than outer ones; the plates within the disc a good deal smaller than those beyond; length to breadth, (20th plate,) 1.2 : 1. Upper arm-plates regular, oval heart-shaped, with the point inward; length to breadth, (9th plate,) 1.2 : 2.2. Grains of disc, under the microscope, like very short, blunt spines, about 25 to a square millim., of the same character below, but less numerous. Arm-spines 5, robust, rounded, somewhat flattened, a little tapering, blunt; third spine from the top longest; the longest spines are near the 20th joint; lengths to that of under arm-plates, (18th joint,) 2, 2.2, 2.7, 1.8, 1.5 : 1.2; two lowest spines more slender than the upper ones. Sometimes a short, supplementary spine above. Longest spine on this specimen, 3.2 millim. Close to the disc there are often 6 spines, which, however, are smaller than those beyond. Tentacle-scales large, rounded oval; on first two or three joints 2, on the rest only 1. Color, in alcohol: above, disc uniform gray brown; arms yellowish brown, barred with darker; some of the upper arm-plates finely marbled with lighter; below, several shades of light brownish yellow; a light brown stripe running along the lateral sides of the under arm-plates.

Variations. The pattern of the color varies little, but the ground tint may have more of yellowish gray or of brown. The proportions of arms to disc vary from about 5 to 9 times, according to age and other circumstances. Very large specimens have the disc 22 millim. in diameter, and 6 or 7 spines on most of the arm-joints. A young one had 4 arm-spines and only 2 tooth-papillæ; the disc was covered with imbricated scales and only a few large grains; the disc was to the arms as 3.2 : 22.

O. Alexandri was first received from my friend, Mr. Alex. E. R. Agassiz, after whom I have named it. It resembles *O. pumila*, but differs in having the 3d (or 4th) arm-spine much longer than the rest.

Acapulco, West Coast of Central America. Alex. E. R. Agassiz.

Museum of Comparative Zoölogy, Cambridge.

Cape St. Lucas, Lower Cal. J. Xantus.

Smithsonian Institution.

ADDITIONS AND CORRECTIONS.

Ophiura teres has radial shields until it attains a considerable size. The specimens before described (page 198) were very large, and had the disc completely covered with grains. Four smaller specimens, since received, three from Mr. A. E. R. Agassiz, at Panama and Acapulco, and one from Mr. Xantus, at Cape St. Lucas, all had radial shields. The largest of these had a disc of

29 millim., and arms of 100 millim. The smallest had a disc of 14 millim., and arms of 35 millim.; there were 7 or 8 arm-spines; most of the upper arm-plates were broken in only two pieces; the color was very dark umber, with fine, sinuous, black lines on the disc.

Ophiura brevispina (Say) is unquestionably a true *Ophiura.* According to the original description, it must be a brittle-star without radial shields, (this excludes *O. cinerea, O. rubicunda,* and *O. squamosissima;*) with arm-spines of equal length, (which throws out *O. elaps;*) with undivided upper arm-plates, (it cannot then be *O. guttata;*) with only 7 arm-spines, and the sides of the disc "concavely arched," (which eliminates *O. brevicauda;*) there remains therefore only *Ophioderma* (*Ophiura*) *serpens,* (Ltk.) which agrees well with Say's description, and is found abundantly in Florida. In future, therefore, *Ophioderma serpens,* (Ltk.) must fall among the synonymes of *Ophiura brevispina,* (Say.) It is satisfactory to know that all of Say's *Ophiuridæ* have now been identified. They stand thus: —

SAY'S NAMES.	PRESENT NAMES.
Ophiura angulata, (Say.)	*Ophiothrix angulata,* (Ayres.)
Ophiura elongata, (Say.)	*Amphiura cordifera,* (Lyman.)
Ophiura crassispina, (Say.)	*Ophiocoma crassispina,* (Ltk.)
Ophiura reticulata, (Say.)	*Ophionereis reticulata,* (Ltk.)
Ophiura brevispina, (Say.)	*Ophiura brevispina,* (Say.)
Ophiura appressa, (Say.)	*Ophiura appressa,* (Say.)
Ophiura paucispina, (Say.)	*Ophiolepis paucispina,* (Ltk.)
Ophiura isocantha, (Say.)	*Ophiostigma isocantha,* (Ltk.)
Ophiura flaccida, (Say.)	*Ophiomyxa flaccida,* (Ltk.)
Ophiura cirrosa, (Say.)	*Asterochema oligactes,* (Örsted.)

Dr. Lütken agrees with me in my identification of *Asterias cordifera* (Bosc,) (see page 203,) and wishes to change the name *Amphiura cordifera* (Ltk.) to *Amphiura Riisei,* (Ltk.)

Ophionereis, (Lütken.)

Ophionereis Xantusii, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 7.7 millim.

Width of arm, without spines, 1.2 millim. Length of arms, 40 millim. Mouth-papillæ 10 or 11 to each angle of the mouth, small, rounded, somewhat flattened. Teeth 4, thin, flat, squarish; lowest one thicker, and with a rounded cutting edge. Mouth-shields much rounded, heart-shaped, with narrow end inward; length to breadth, 1 : .9. Side mouth-shields short, triangular, widely separated within. Under arm-plates squarish, a little longer than broad; outer side slightly curved, lateral sides a little reënteringly curved; length to breadth, (17th plate,) .5 : .4. Upper arm-plates triangular, with a rounded angle directed outward, and a sharp angle directed toward each side; length to breadth, (11th plate,) .5 : .9. Supplementary pieces as long as the joints, triangular, with the outer side curved. Disc-scales very close and fine; about 200 to a square millim. Radial shields very small and narrow; about .7 millim. long. The usual comb of papillæ along the genital slits is not much developed. Arm-spines 3, rather short, and flattened; cut off square at the end; middle one longest; lengths to that of under arm-plate, (17th joint,) .7, 1.2, .9 : .5. Tentacle-scale 1, large, round, thin. Color, in alcohol: disc faint greenish gray, finely lined with brownish; above the base of each arm a dark purple fork, of two converging lines; sometimes a few other veins of dark purple; arms brownish straw-color, with a faint, broken line of whitish running lengthwise; at intervals of from 5 to 12 joints, a dark purple joint, making a cross-band; below, interbrachial spaces same as upper surface; other parts light straw-color.

Variations. The dark markings at the base of the arms may differ somewhat in shape and size; and the arm-bands may go entirely round, or be confined to the upper surface. A small specimen, with a disc of 4.2 millim., had arms of 22 millim. The number of disc-scales to a square millim. was about the same as in the larger ones. The lower arm-plates were longer and more concave on their lateral sides; the teeth had all rounded cutting edges; the spines were more rounded and tapering than in the adult; the radial shields could hardly be distinguished. The mouth-shields vary a little, in being more or less rounded.

O. Xantusii differs from *O. annulata* in having shorter and blunter arm-spines, and shorter arms; the color also is different; from *O. reticulata* in blunter arm-spines, shorter arms, and a different pattern of color.

Smithsonian Institution.
Cape St. Lucas, Lower Cal. J. Xantus.

Ophionereis porrecta, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 12 millim. Width of arm, without spines, 2.5 millim. Length of arm, 113 millim. Mouth-papillæ 10, short, stout; the outermost but one broadest. Teeth 4 or 5, stout, squarish, rather long, a little tapering, lowest one shortest. Mouth-shields oval; length to breadth, 1.6 : 1. Side mouth-shields very small, triangular; sometimes almost obliterated. Under arm-plates squarish, broader without than within; outer side curved, inner side nearly straight, lateral sides reënteringly curved; length to breadth, (20th plate,) 1 : 1.2. Upper arm-plates varying in proportionate breadth, according to the width of the arm; usually broader than long; inner side much longer than the outer; outer and lateral sides often confounded in a common curve; length to breadth, (35th plate,) 1 : 1.6. Scales of disc rather stouter than usual in the genus; about 80 to a square millim. Radial shields, 1.2 millim. long. Scales on edge of disc larger than the rest. Papillæ along edges of genital slits stout and prominent. Arm-spines 3, short, rounded, tapering; lengths to that of under arm-plate, (23d joint,) 1, 1.7, 1.3 : 1. Tentacle-scale 1, oval, large. Color, in alcohol: above, disc minutely mottled and lined with dull reddish brown and dirty white; arms the same, but darker, with here and there a lighter joint; arm-spines pale brown, with one or two darker rings; below, interbrachial spaces tawny brown; mouth-parts and under arm-plates white, with specks of several tints of brownish.

Variations. A young one, with a disc of 3 millim., had arms 18 millim. long. The disc-scales were large; about 40 to a square millim.; and, among them, the primary plates could plainly be seen; the radial shields were conspicuous, though small, and were separated by a wedge of two or three scales; the upper arm-plates were nearly circular, and overlapped each other; the under arm-plates were shield shaped, having an angle within, and a wide, straight, outer side, and were entirely separated by the encroachment of the side arm-plates. The coloration varies chiefly in intensity.

The locality of these specimens has unfortunately been lost;

but they are believed to be from the Atlantic coast of America. The species is distinguished from others by the great length of the arms, the shortness of the arm-spines, and the general robustness of the structure.

Florida?

Museum of Comparative Zoölogy, Cambridge.

Ophiopholis, (Müll. & Trosch.)

Ophiopholis Caryii, (Lyman,) sp. nov.

Description of a Specimen. Diameter of disc, 8 millim. Width of arm, without spines, 1.5 millim. Length of arm, 26.5 millim. Mouth-papillæ flat, rounded, scale-like; 3 or 4 on each side. Teeth about 11, broad, short, stout, flat, square; uppermost and lowest ones narrower than those in the middle; uppermost one longest, with a rounded cutting edge; lowest one often split in two. Mouth-shields small, irregular, usually rounded rhomboidal; length to breadth, .6 : .8. Side mouth-shields large, nearly meeting within, curved; closely soldered with surrounding parts. Under arm-plates a little separated, squarish, with curved lateral sides; outer side a little reënteringly curved; inner side made up of three short lines; length to breadth, (8th plate,) .7 : .6. Upper arm-plates irregular oval, with outer side most curved; length to breadth, (3d plate,) .6 : 1. Supplementary pieces irregular, but usually oblong and angular; near the base of the arm, usually 8 or 9 to each plate. Near end of arm the upper arm-plates are nearly round, but they still have 8 or 9 supplementary pieces. Disc, above, closely and perfectly covered with small, rounded grains, about 100 to a square millim.; below, interbrachial spaces closely beset with very short, stout, sharp spines, about 1 millim. long. Arm-spines 5, sometimes 6; short, stout, blunt, more or less flattened; three upper ones largest; 2d spine stoutest and broadest of all; lowest two smaller and more conical; lengths to that of under arm-plate, (8th joint,) .5, .5, .5, .4, .3 : .7; near tip of arm, spines more rounded and tapering. Tentacle-scale 1, thin, flat, narrowest at the base; cut off square at the end; about as long as the lowest arm-spine. Color, in alcohol: above, nearly uniform lake pink, a little deeper near edges of disc; along arms, a faint, broken line of lighter; below, interbrachial spaces near edge of disc same as upper surface, but fading to nearly white near the mouth ; under arm-plates and mouth-parts white, the former edged with reddish along their lateral sides ; side arm-plates and arm-spines same as upper surface, but lighter.

Variations. A young one, with a disc of 2.7 millim., had arms 7.6 millim. in length ; the color was mottled, pink and white ; the disc was pretty closely covered with grains, or very short spines, each bearing a crown of three little thorns ; the arm-spines were rounded and conical, but not at all flattened. Another specimen had a disc of only 2.2 millim., and arms of 8.1 millim. ; this one had all the supplementary pieces of the upper arm-plates covered with minute thorns. The smallest specimen had a disc of 1.9 millim., and arms of 5.4 millim. The disc granulation, arm-spines, mouth-papillæ, and supplementary pieces of the arm-plates, were all thorny. Arm-spines 5 ; mouth-papillæ 2 ; lower arm-plates longer than broad, narrowest within, with a reëntering curve on the outer side and a notch on the inner ; upper arm-plates longer than broad.

This small species is distinguished from *O. Kennerlyi* and *O. aculeata* by having the disc *entirely* covered with fine grains, without naked plates.

San Francisco, Cal. T. G. Cary.

Museum of Comparative Zoölogy, Cambridge.

Prof. Agassiz observed that among starfishes lately received from Acapulco was a *Pygorhynchus*, found living there in abundance,—the genus being before known only in the fossil state ; this would enable the structure of this animal to be definitely made out.

Dr. White called attention to a fine specimen of the skull of a hippopotamus, recently purchased for the Society by subscriptions obtained by Dr. S. A. Green from Messrs. James M. Barnard, J. N. Borland, William R. Lawrence, A. A. Lawrence, and James Lawrence, to whom the thanks of the Society were voted.

The Corresponding Secretary read the following letters, viz: —

From Charles W. Holman, New York, February 28, asking for the Proceedings for the library at Westeras, Sweden; Bibliothekariat der K. Bayerischen Akademie, October 1, 1859, presenting various publications; John Evans, Washington, January 18, Alpheus S. Packard, Jr., Brunswick, Me., January 19, Theodore N. Gill, Brooklyn, N. Y., January 23, and Edward Norton, Albany, March 16, accepting Corresponding Membership; William J. Sloan, Surgeon U. S. A., Santa Fe, New Mexico, February 14, proposing to establish relations between the Society and the Historical Society of New Mexico.

On motion of Mr. Binney, a committee was appointed to take into consideration the subject of an Annual Address before the Society in May next. The President appointed Messrs. Binney, Lyman, and White the Committee.

Messrs. H. Farnum Smith, F. C. Ropes, and Augustus Lowell, all of Boston, were chosen Resident Members.

DONATIONS TO THE MUSEUM.

January 4, 1860. Three fossil corals from Canada, near Niagara Falls; by Dr. H. Bryant. A forked-tailed humming-bird (*Mellisuga Langsdorfii*, Vieill.); by Mr. Charles L. Flint. The humerus of an albatross; by Mr. Kilby Page.

January 18. Lower jaw of a sperm whale, sixteen feet in length; by Mr. F. W. Choate, of Beverly, Mass. An annelid (*Nereis*) from the Grand Bank of Newfoundland, and rounded balls of iron pyrites from Newfoundland; by Capt. N. E. Atwood.

February 1. Dried and inflated lungs of a snapping-turtle, and a frog intermediate between the imperfect and perfect animal; by Mr. John Homans, Jr. Two teeth of the sperm whale; by Mr. William P. Anderson, of Roxbury, Mass.

February 15. Several freshwater fishes, crustaceans, and mollusks from the Sandwich Islands; two marmoset monkeys from Brazil; a malformed fœtal dog; a noddy tern; a gecko and reptilian egg from Lahaina; skin and viscera of a New Zealand mocking-bird (*P. Novæ Zealandiæ*, Gmel.); by Dr. C. F. Winslow. Section of an elephant's tusk, in which an iron musket-ball was imbedded in a canal of osteo-dentine; by Mr. Joseph L. Bates. Three teeth of the sperm whale; by Mr. Thomas M. Devens, of Charlestown, Mass. Skull of a beaver, from Lake Superior; by Mr. J. S. Fay. Saw-billed humming-bird (*Grypus nævius*, Dumont), and the military manakin (*Pipra militaris*, Shaw); by Mr. Charles L. Flint.

March 7. Two birds of Paradise (*Paradisea apoda*, Linn.); by Mrs. Joseph Coolidge. A woodpecker; by Mr. J. M. Forbes. Nests of the yellow-rumped warbler (with egg), and the red-eyed and yellow-throated vireos; by Mr. H. A. Purdie. *Paradoxides Harlani* from St. Mary's Bay, Newfoundland, and a piece of birch tree gnawed by beavers; by Mr. Smith McKay, of St. Johns. Skulls of a horned owl, spotted tortoise, and brown bat, and thirteen teeth of the alligator; by Dr. H. Bryant. Tooth of sperm whale; by Dr. B. S. Shaw. Skull, sternum, and trachea of noddy, and large spider from the Falkland Islands; by Dr. C. F. Winslow. Digestive apparatus and heart of the fox shark, and of the gray shark, (*Odontaspis griseus*); by Dr. D. H. Storer. Bituminous earth from Brazil; by Mr. A. M. Edwards, of New York.

March 21. Skull, with lower jaw, of a very large hippopotamus; by Messrs. J. M. Barnard, J. N. Borland, Wm. R. Lawrence, A. A. Lawrence, and James Lawrence. Skeletons of opossum, squirrel, and turtle; twelve skulls of mammals, nine of birds, four of turtles, two of fish, with the hyoid and ear bones of man, and other bones; by Dr. S. Kneeland, Jr. Section of the trunk of a very large and rapidly-grown black Italian poplar, to show the annual rings, from Lowell, Mass.; by Mr. G. B. Emerson.

BOOKS RECEIVED DURING THE QUARTER ENDING MARCH 31, 1860.

Catalogue of Astor Library. M–P. 8vo. New York, 1859. *From the Librarian.*

Phycologia Australica. Nos. 9 to 22. By W. H. Harvey, M. D., &c. 8vo. London, 1858–9. *From Dr. B. D. Greene.*

Description Géologique et Minéralogique du département du Bas-Rhin. Par M. A. Daubrée. 8vo. Strasbourg, 1852. *From the Author.*

Notes on the Aurora of the 28th of August. By Prof. W. B. Rogers. 8vo. Pamph. Edinburgh, 1860. *From the Author.*

Saggio di Ditterologia Messicana, di L. Bellardi. Parte 1. 4to. Torino, 1859. *From the Author.*

Descriptions of New Species of Fossils. By J. H. McChesney. 8vo. Pamph. Chicago, 1859. *From the Author.*

Edinburgh New Philosophical Journal. Vol. X. No. 2, for October, 1860. *From Prof. H. D. Rogers.*

Proceedings of the American Antiquarian Society. October, 1859. 8vo. Pampn. *From the American Antiquarian Society.*

Memoir on the Salubrity of the Isle of Pines. By Don J. de la Luz Hernandez. 8vo. Pamph. Habana, 1857. *From the Author.*

Address by Richard Owen, M. D., &c., to the British Association. 8vo. Pamph. *From the Author.*

Letter of Mr. Wallace on the Geographical Distribution of Birds. 8vo. Pamph. *From the Editor of the "Ibis."*

Report of the Superintendent of the Coast Survey for 1858. 4to. Washington. *From Prof. A. D. Bache.*

L. Bellardi. Description des Cancellaires Fossiles des Terrains Tertiaires du Piémont. Pamph. 4to. Turin, 1841. *From the Author.*

P. Nisser. Geological Distribution of Gold. 12mo. Pamph. Melbourne, 1859. *From the Author.*

Catalogue of Recent Marine Shells, on the Coasts of North and South America. By J. D. Kurtz. 8vo. Pamph. Portland, 1860. *From the Author.*

Der Zoölogische Garten. No. 1, Vol. 1. Edited by Dr. D. F. Weinland. 8vo. Pamph. Frankfort, 1859. *From the Editor.*

Arctic Boat Journey. By I. I. Hayes. 12mo. Boston, 1860. *From the Author.*

Annual Report of the Geological Survey of the State of Wisconsin. 8vo. Pamph. Madison, 1858. *From E. Daniels.*

Observations on the Genus Unio. By Isaac Lea. Part 2. Vol. 7. 4to. Pamph. Philadelphia. *From the Author.*

Descriptions of Unionidæ, &c. By Isaac Lea. 8vo. Pamph. Philadelphia, 1860. *From the Author.*

Report on the United States and Mexican Boundary. By Major W. H. Emory. Vol. 2. 4to. Washington, 1859.

Pacific Railroad Survey. Vol. 10. 4to. Washington. *From Hon. Charles Sumner.*

Synopsis of Freshwater Fishes of Trinidad. By Theo. Gill. 8vo. Pamph. New York, 1858.

Description of a New Generic Form of Gobinæ from the Amazon River. By the same. 8vo. Pamph.

Description of New Species of Genus Cypræa, (Linn.) By the same. 8vo. Pamph. *From the Author.*

Forhandlinger ved de Skandinaviske Naturforskeres Syvende Möde. 1. Christiania den 12–18 Juli, 1856.

T. Kjerulf. Das Christiania-Silurbecken. 4to. Pamph. 1855.

Fortsatte Jagttagelser over de erratiske Phænomener. Af J. C. Hörbye. 8vo. Pamph.

Angaaende Kongsberg Solvvært. S. No. 5. 4to. Pamph.

Observations sur les Phénomènes d'Erosion en Norvège. Par J. C. Hörbye. 4to. Pamph. *From the Royal University of Christiania, Norway.*

Natural History of the Slug-worm. By Wm. D. Peck. 12mo. Pamph. Boston, 1799.

Instructions for Collecting and Preserving Subjects of Natural History. By E. Donovan. 8vo. Pamph. London, 1794.

J. Raii Synopsis Methodica Avium. 12mo. Londini, 1713.

Catalogue of Plates to Rees's Cyclopædia. 4to.

Collection des Oiseaux les plus rares. Small fol. Paris. *From Dr. B. J. Jeffries.*

Journal of the Royal Dublin Society. No. 15. October, 1859.

Bulletin de la Société de Géographie. Tome XVII. 8vo. Paris, 1859.

New York Journal of Medicine. No. 101, for March, 1860.

Silliman's American Journal of Science and Arts. Vol. XXIX. No. 86, for March, 1860.

Bulletin de la Société de Géographie. Tome XVIII. 8vo. Paris, 1859.

L. Bellardi e G. Michellotti. Saggio Orittografico sulla Classe dei Gasteropodi Fossili dei Terreni Terziarii del Piemonte. 4to. Pamph. Torino, 1840.

Württembergische Naturwissenschaftliche Jahreshefte. 3. 8vo. Stuttgart, 1859.

Natural History Review. Vol. VI. Nos. 1 to 3. London, 1860.

Proceedings of Dublin University Zoölogical and Botanical Association. Vol. 1. Nos. 1, 2. 8vo. Dublin, 1859.

Coleopterist's Manual. Part 2. (Beetles.) By Rev. F. W. Hope, F. R. S., &c. 8vo. London, 1838.

Transactions of the Royal Irish Academy. Vol. XXIII. Part 2. 4to. Dublin, 1859.

Proceedings of the same. Vol. VII. Parts 1–8. 8vo. Dublin, 1858–9.

Memoirs of the Geological Survey of India. Vol. 2. Part 1.

Notices of the Proceedings of the Royal Institution of Great Britain. 8vo. Part IX. Nov. 1858 — July, 1859. London.

Memoirs of the American Academy of Arts and Sciences. New Series. Vol. VII. 4to. Cambridge, 1860.

Proceedings of the Academy of Natural Sciences at Philadelphia. pp. 128–168; 327 to end of volume, 1859; pp. 1–80, 1860.

Journal of the same. Vol. IV. Part 3. 4to. 1860.

Canadian Journal of Industry, Science, and Art. No. 24, for January, and No. 26, for March, 1860. Toronto.

Canadian Naturalist and Geologist. Vol. IV., No. 6, December, 1859, and Vol. V., No. 1, February, 1860. Montreal. *Received in Exchange.*

Annals and Magazine of Natural History. Vol. V. No. 25, for January, and No. 26, for February, 1860. London.

Quarterly Journal of the Geological Society. Nos. 60, 61, for February, 1860. 8vo. London.

S. Hanley. Ipsa Linnæi Conchylia. 8vo. London, 1855. *From the Courtis Fund.*

Encyclopædia Britannica. Vol. XIX.

Geo. H. Moore. Treason of Charles Lee. 8vo. New York, 1860. *Deposited by the Republican Institution.*

CATALOGUE OF THE HARRIS LIBRARY.

Abbot, John. Original Drawings of the Lepidopterous and Coleopterous Insects of Georgia. Folio. 1830.

Agassiz, L. Nomenclatoris Zoölogici Index Universalis. 12mo. Soloduri, 1848.

Agassiz and Cabot. Lake Superior. 8vo. Boston, 1850.

Agassiz and Gould. Principles of Zoölogy. 12mo. Boston, 1848.

Annales de la Société Entomologique de France. Vols. 1–11. 8vo. Paris, 1832–42. Table Alphabétique du 1er, 2nd, et 3me vols. 8vo.

Atlas des Insectes. 16mo. Paris.

Aubé, C. Hydrocanthares. 8vo. Paris, 1836.

Bohn, J. Catalogue of Ancient and Modern Books on Natural History. 8vo. London, 1835.

Boisduval, Dr. Icones Historiques des Lépidoptères. 8vo. Paris, 1832.

Boisduval, Dr. Species Général des Lepidoptères. Tome 1er. 8vo. Paris, 1836.

Boitard. Manuel d'Entomologie. 2 vols. 24mo. Paris, 1828.

Brown, D. J. The Naturalist. Vol. 1. 8vo. Boston, 1831.

Brown, T. Book of Butterflies, &c. 3 vols. 16mo. London, 1834.

Burmeister, H. Manual of Entomology. 8vo. London, 1836.

Catalogue of the Animals and Plants of Massachusetts. 8vo. Amherst, 1835.

Coates, B. H. Remarks on Larva of Hessian Fly. 18mo. Philadelphia, 1841. Pamph.

Coquebert, A. J. Illustratio Iconographica Insectorum. 3 Decades in 1 vol. 4to. Paris, 1799–1804.

Cuvier, G. Le Règne Animal. 4 vols. 8vo. Paris, 1817.

Dalman, J. W. Analecta Entomologica. 4to. Holmiæ, 1823.

Dana, J. D. Structure and Classification of Zoöphytes. 4to. Philadelphia, 1846.

De Geer, K. Abhandlungen zur Geschichte der Insekten. 4to. Vols. 3–5 bound in 2. Nürnberg, 1780–1.

Dejean. Catalogue des Coléoptères. 3d ed. 8vo. Paris, 1837.

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April 4, 1860.

The President in the Chair.

Prof. Agassiz alluded to the theory of Prof. Rogers on subsidence and denudation as ingenious, and capable of explaining the facts in the case, but did not see indications of these two phenomena, nor any proofs of such extensive denudation as is required by it.

He exhibited a series of fossils to show the distinctness of faunæ, explaining why it is not always correct to identify geological periods by the identity of fossils; two questions are involved in the examination of this subject, one that of time or of period, the other that of space or limitation of faunæ.

Preliminary to the principal topic, he stated that he knew no such thing as a variety in the animal kingdom, except such as are stages of growth, within the limits of species; he instanced as an example one of the meandrine corals (*Manicina*), and other polymorphous types, which come within this law; in 1200 echini which he had examined and carefully studied, he had not found a single variety which did not arise from an imperfect stage of growth; so in 6000 fishes, he had not seen a variety except in coloration, which he had before shown was connected with their growth. So that he would start with the propositions that animals do not vary, and that species remain within the limits of their type.

He exhibited three species of *Toxaster*, a spatangoid echinoderm found in the lower cretaceous deposits, and which occurs in successive beds of the neocomian. He showed the relation of these to other echinoderms, and the gradations in the various orders. Of the four orders, crinoids, starfishes, echini, and holothurians, the first is synthetic, combining some features of the higher orders, yet on the whole inferior to them; this is the earliest and prophetic type, and is found from the Potsdam sandstone up to the present time, from the cretaceous upward mostly free. Starfishes and echini begin with the Triassic period, and are numerous now; the crinoids of the Permian and carboniferous have affinities with the echinoids and starfishes; from their structure these are perishable, and hard to preserve in a fossil state, — the echini being the best preserved; the slender-armed ophiuroid genera are the oldest. Echini increase as crinoids diminish, arriving at their maximum in the cretaceous, and from that becoming less numerous; only two are found here, on the coast of South Carolina half a dozen, on that of Florida more than twelve, and not more than two dozen would be found in the most favorable localities under the tropics; fifteen species might be considered a fair representative of a fauna, and that number are found in subdivisions of the Jurassic and cretaceous; and these, therefore, may be adduced as evidence of the distinctness of the faunæ. The echini as an order present four types or sub-orders: 1st, *Echinus* proper, with the mouth central below and the anus central above, with such types as *Cidaris*, *Diadema*, *Echinus*, *Echinometra*, &c.; 2d, *Echinolampas*, with no teeth; 3d, *Clypeaster;* and 4th, *Spatangus.* No holothurian has as yet been found fossil, and, if not exclusively belonging to the present epoch, they probably did not antedate the Tertiary period. All echini found in the Trias, Lias, Oölite, and Jurassic belong to the 1st sub-order, the 2d and 4th coming in during the cretaceous period; the older forms have the more simple ambulacra; the earliest spatangoids have no connecting groove between the pores, in this respect resembling echinoids, but the later ones present this groove; the specimens exhibited had such echinoid affinities. The relation between these sub-orders and their types is unmistakable, showing something more than derivation, and indicating a system or plan. Thanks to Johannes Müller, the embryology of the four sub-orders of echini is well known; the young *Echini*, &c., are like the adult *Cidaris;* so the young *Echinolampas*, *Clypeaster*, and *Spatangus* have the typical form of *Cidaris*. These facts do not look like the effects of sexual derivation, but show a plan, followed in all, and not modified by external circumstances. We have these animals now, and yet the older forms are not extinguished; in every generation we see the growth proceed from *Cidaris* to *Spatangus*, showing that the laborious growth required by Darwin's theory is not logical.

Prof. W. B. Rogers made some remarks supplementary to those of the preceding meeting, on the effects of a subsiding and a rising ocean-floor, as seen in the stratigraphical relations of the resulting land.

If we assume an upward movement of the sea-bottom as the leading condition under which the paleozoic strata were deposited, we must admit a depth of the sea at the commencement of these formations so enormous as to be incompatible with the accumulation of the materials of the earlier strata, unless indeed we suppose these strata to have been formed exclusively in positions within a moderate distance of the shore. But this supposition of a comparatively littoral deposit would not explain the conditions in which the strata are actually known to occur.

We might imagine a series of strata to be successively laid down in a gentle slope, approximately parallel to that of the ancient sea-bottom, each terminating against this surface without being continued into the profounder depths beyond, and we might suppose the floor to be uprising in the region of this accumulation at such a rate as to bring successive tracts, farther and farther from the ancient shore-line, within limits of depth admitting of mechanical and organic deposition. But in such circumstances of formation, these earlier strata, instead of extending, as they are believed to do, almost continuously over the whole ocean-floor, would be seen to terminate at no great distance from the original shore-line, by abutting against the bottom at the places where the depth had set a limit to their accumulation.

Thus, therefore, on no hypothesis of a *secular rising* of the sea-bottom can we explain the formation of our Appalachian paleozoic deposits. On the other hand, considering their aggregate thickness, as well as their continuity, composition, and stratigraphical arrangement, we are entitled to conclude that they were accumulated during *a long period of subsidence of the ocean-floor, varied by many and long pauses and upward oscillations.*

Prof. Rogers added a brief notice of the structure of the middle secondary belt of sandstones of the Middle States as a good example of the successive accumulation of shore-deposits previously referred to. He showed that the uniform and gentle slope of all the strata in one direction, and the nature of the materials composing them, concur in indicating the directions from which they have been derived; and he pointed out the manner in which the successive parallel strata in their downward extension terminate against the ancient floor, which in some cases is so shallow as to be partly exposed, with the abutting strata, in the natural sections of the country.

Prof. Agassiz replied that he admitted the shallowness of the ocean in which these strata were deposited; during a local upheaval of the shore, the whole bottom was, in his opinion, subsiding from the shrinking caused by the cooling of the earth's crust. He alluded to the transverse rents across the New York strata in a direction north and south, and mentioned the Schoharie valley, in which the strata increase in thickness from north to south, indicating that the seaside was to the south and the shore-line to the north. He could detect no signs of denudation in these ancient strata of New York. The Potsdam sandstone is both geologically and topographically the lowest.

Prof. Rogers replied that he had listened with extreme surprise to the statement just made by Prof. Agassiz, disclaiming the theory of the rising of the ocean-floor during the formation of our northern paleozoic strata. According to his recollection, the discussion was commenced by Prof. Agassiz's denying the correctness of the views of Darwin and others of the extensive destruction of strata and their fossils during a period of slow upheaval, and urging as an insuperable objection the great extent and completeness of the paleozoic series of New York, which he maintained had been deposited during a *period of upheaval.* As, however, Prof. Agassiz has now stated that he recognizes the *subsidence* of the ocean-bed as essential to the theory of their formation, Prof. Rogers thought it of no importance in this connection how that depression may have been brought about, or whether it was accompanied by a stationary or a rising condition of the ancient shore.

In answer to an inquiry from Dr. Gould, whether marine deposits are thickest toward the ocean, Prof. Rogers replied that there is no definite rule in this respect, though in the aggregate they are generally thinner in that direction; and he mentioned from measurements in the Appalachian region, that the total thickness there is very greatly less toward the centre.

Prof. Agassiz instanced the *Pholas* borings in the miocene (*mollasse*) of the Jura, in the very edges of the strata, as disproving the statement of Darwin that there is destruction on the edges of strata during upheaval; in this case there was no such destruction during or after upheaval.

Prof. Rogers replied that of course this is not the inevitable result in every case; and in this particular instance it is easy to explain the fact. The occurrence of a stratum containing well-preserved fossils, in direct contiguity with the pholas-bearing rocks, is proof of quiet during the formation of the stratum, and therefore of the protection of these rocks from denudation during the deposit.

Mr. Putnam presented from the Museum of Comparative Zoölogy ten specimens of fishes from Lake Neufchatel, and one from the rivers of Switzerland, all very much resembling their American congeners, interesting as showing the great resemblance, yet perfect specific distinctness, of the representative faunæ of Europe and North America.

Dr. Winslow presented an extensive collection of fishes, crustaceans, mollusks, and radiates made by himself at Maui, one of the Sandwich Islands; with others formerly presented by him, these would form a very good representative fauna of this island, and he desired them to be kept in a case by themselves for this purpose.

Prof. Hamilton L. Smith, of Gambier, Ohio, was chosen a Corresponding Member; and Mr. Lincoln F.

Emerson, Dr. J. C. Dalton, and Mr. Charles G. Brewster, of Boston, and Dr. J. R. Webster of Milton, Resident Members.

April 18, 1860.

The President in the Chair.

Dr. Kneeland, on the occasion of the exhibition of two albino children, gave an account of their appearance, and a sketch of albinism in general.

The children are both girls, of the ages of four and seven years, born of parents both black. The parents have had several other children, and one black child between these two. The hair is milk-white, possessing all the characters of negro hair except color; the skin is soft and white; the iris is colorless, and with the pupil has the ordinary pink tint of albinos from the color of the vessels of the choroid; the eyebrows, eyelashes, and down on the body, are pure white. The nose is flattened, the lips protuberant, the heels prominent, as in the black race; and from the external appearance (except in color), the voice, attitudes, and expression, they would pass for common children of black parents. They are active, intelligent, good-natured, and healthy; the parents are also healthy. The eyes are very sensitive to light, and near-sightedness is quite pronounced.

Mr. Du Chaillu gave an account of the habits and the distribution of the Gorilla and other anthropoid apes, from personal observation on the west coast of Africa.

Though a few are found on the left bank of the Gaboon River and about Cape Lopez, the gorillas and the nschego are most numerous in the table-lands of the interior. He never saw more than five gorillas together; the females and young always run off at the sight of man, but the males, if encountered in their retreats, invariably offer battle, approaching the hunter, loudly roaring and beating the breast with their hands, with an ungainly and difficultly balanced swinging gait. They are shy, though they sometimes come into the woods in the neighborhood of villages in search of berries; they do not climb trees, except when young, and both sexes repose on the ground, the female reclining against a tree, and the male against some convenient stone; they never make any shelter for themselves, and never repose twice in the same place. The gorilla sometimes roars by himself for hours at a time. He had never seen them erect their crests when angry and about to attack; unlike the chimpanzee, the gorilla is perfectly untamable. They are found for three hundred miles eastward from the table-lands, most abundantly where grow the pineapples, nuts, and wild canes, upon which they feed; their food is entirely vegetable; they are generally found in moist places. The male gorilla is born black, and remains black through life; the chimpanzee changes from yellowish coppery to black, but the gorilla is the most shining black; the female is reddish black; the back and breast are bare; it grows gray, and it is said perfectly white, in old age. They have one young one at a birth.

The natives are fond of their flesh; the brains are held also in high esteem as fetiches to inspire the hunters with courage; they are called by some tribes "men-of-the-woods," and are by some considered transformed men. He gave several instances of their ferocity and strength; the stories of their entering villages, driving away the inhabitants, carrying off women, seizing travellers and drawing them into trees by their feet, are all fables.

The nschego is known by its bald head. This species always lives in the trees, in which it makes shelters of branches and vines like an umbrella; they always select slender trees for their habitations, and such as do not touch other trees with their branches, and place them at least twenty feet from the ground,—probably to secure themselves against the attacks of animals. They are white when young, becoming dark with age.

Dr. B. J. Jeffries exhibited a table, which he had made to assist in determining the question of the degeneracy of the American race at the present time. The table comprised the age, weight, and height of 100 men belonging to a military company of this city, arranged in series of 25, as follows:—

NO.	AGE.	HEIGHT.		WEIGHT.
25	669 yrs.	143 ft.	4½ in.	3782½ lbs.
25	765	144	1½	3979½
25	785	143	3	3794½
25	760	144	10½	3927
100	2979	575	7½	15,483½
Average..	29.79	5	9	154.83

Oldest person, 56 years; youngest, 18 years; tallest, 6 ft. 4 in.; shortest, 5 ft. 3 in.; heaviest, 205 lbs.; lightest, 110 lbs. Born in Boston, 70; in other parts of Massachusetts, 21; in Maine, 4; in New Hampshire, 2; in New York, New Jersey, and Pennsylvania, 1 each; = 100 men.

Prof. Jeffries Wyman made a communication on two parasites which he had recently had an opportunity of examining.

During the last winter in Florida he found that the alligators almost always had in the last branches of the portal veins a species of *Linguatula*. This belongs to one of the migratory types; in its perfect form it appears lower than in its imperfect condition, — the young having certain crustacean affinities, while the adult is classed among worms; the young have no generative organs, and live in some vegetable-feeding animals, which are swallowed by carnivora, from whose intestines they wander to the liver and other parts of the body.

The other parasite was a Gordiaceous worm found under the dura mater of the *Anhinga* or snake-bird, between the cerebellum and the cerebral hemispheres. He found it in seven out of eight specimens examined, and it probably existed in the eighth; it resembled *Gordius*, with the mouth anterior, the genital opening posterior, and no anal opening. This belongs also to a migratory group. It was found in no other part of the bird.

Dr. C. T. Jackson exhibited a large mass of pearl-covered secretion from a Unio from Michigan; the nacre thrown out in this case was uncommonly large, and divided like a bunch of small grapes.

Dr. C. T. Jackson read letters from Dr. Evans and Prof. Henry of Washington, in relation to the great Oregon meteorite; though individuals of the Society had written on the subject, it was feared that from want of a memorial from the Society the appropriation necessary to obtain it would not be inserted in the Congressional bill. On his motion it was voted that a committee be appointed, with full powers, to see what can be done in the matter, and to take any steps which may seem likely to secure the whole or a portion of this valuable specimen for the Museum at Washington.

The President appointed Drs. C. T. Jackson, Bacon, and Shaw, to whom the President was afterward added.

The President read letters of resignation from Dr. D. H. Storer, Dr. S. Durkee, and Dr. Borland, severally resigning the offices of Vice-President, and Curatorships of Microscopy and Herpetology.

The President appointed the following gentlemen a Committee to nominate officers for the ensuing year: Drs. Borland, C. E. Ware, and J. B. S. Jackson.

Messrs. Sprague and Whittemore were appointed a Committee to audit the Treasurer's accounts, and that of the Trustee of the Courtis Fund.

The Treasurer moved to so change the By-Laws of the Society as to make the annual assessment five dollars instead of three, and moved to lay it on the table until the next meeting.

Messrs. Randolph M. Clark of Boston, and Joseph Moore of Cambridge, were chosen Resident Members.

Annual Meeting, May 2, 1860.

The President in the Chair.

The Records of the last annual, and of the last regular meeting, were read and approved.

The Annual Reports of the Treasurer, Librarian, and the Curators, with the exception of those of Geology and Ornithology, were read and accepted.

The Treasurer reported a balance on hand of $159.65.

Besides the large sums paid the former Treasurer and Collector, the expenses of the Cabinet and Journal have been several hundred dollars larger than usual. Nevertheless, thanks to the large surplus at the beginning of the year, the Society is free from debt, and, with the proposed increase of the annual assessment, may even hope to restore the Building Fund, which was necessarily sacrificed to remove its indebtedness. The total number of resident paying members is about 200.

The Librarian reported the addition of 540 volumes and pamphlets during the past year, of which 360 were by donation.

The most valuable consists of the Entomological Library of the late Dr. T. W. Harris, of about 300 volumes, purchased and presented to the Society by J. P. Cushing, Esq., of Watertown, Mass. If the Library increase in the same proportion for another year, there will be no place for the books in the present room. About forty new subscribers have been obtained for the Journal; as this is the principal means of securing the Transactions of other Societies, it is to be hoped that the subscription, which is not burdensome, may be still further increased, until it become general.

The department of Ichthyology has been increased by about 200 species, mostly new, and at least one half of them undescribed.

The principal accessions have been from the Bahamas, by Dr. Bryant; from Maui, Sandwich Islands, by Dr. C. F. Winslow; and authentic original specimens from Prof. Agassiz.

Nearly 300 specimens have been added to the department of Comparative Anatony.

New cases and shelves have been added, and the collection arranged in systematic order, heretofore impracticable; the wet preparations have been re-bottled in fresh spirit, and exhibit an interesting series of fœtal animals and dissections. An acid and alcoholic solution of strychnia has been found effectual against the ravages of insects, and the chloride of calcium against the dampness and fungous growths in the cases. The specimens have been newly numbered and named, and the nucleus of a helminthological collection has been formed.

The labor of transferring the Harris Collection to the large cabinets, and of making the catalogue, is going steadily on, and will probably be finished in another year.

The department of Crustacea has been increased by 366 specimens, of 78 species and 55 genera, principally from Dr. Bryant from the Bahamas, and Prof. Agassiz and Dr. Winslow from the Sandwich Islands.

The marine algæ procured by Prof. Wm. H. Harvey from Australia, Ceylon, and the Friendly Islands, and presented to the Society by Dr. B. D. Greene, have been securely placed in four quarto volumes, named and numbered as indicated by Prof. Harvey.

All the other departments are in good order, and will be largely increased whenever greater accommodations can be afforded in a new building; the departments of Mineralogy, Oölogy, and Conchology, are specially suffering for want of room.

Mr. Whittemore declined a nomination as Curator of Conchology.

The Nominating Committee made the following report, which was accepted, and the officers for the ensuing year were chosen as follows:—

President,

Jeffries Wyman, M. D.

Vice-Presidents,

Charles T. Jackson, M. D. A. A. Gould, M. D.

Corresponding Secretary,

Samuel L. Abbot, M. D.

Recording Secretary,

Samuel Kneeland, Jr., M. D.

Treasurer,

Amos Binney.

Librarian,

Charles K. Dillaway.

Curators,

Thomas T. Bouvé,	*Of Geology.*
John Bacon, M. D.,	*Mineralogy.*
Charles J. Sprague,	*Botany.*
Thomas M. Brewer, M. D.	*Oölogy.*
Henry Bryant, M. D.,	*Ornithology.*
F. W. Putnam,	*Ichthyology.*
Theodore Lyman,	*Radiata.*
J. C. White, M. D.,	*Comparative Anatōmy.*
Samuel H. Scudder,	*Entomology.*
Albert Ordway,	*Crustacea.*
B. J. Jeffries, M. D.,	*Microscopy.*
A. T. Lyman,	*Conchology.*
Samuel A. Green, M. D.,	*Herpetology.*

Cabinet Keeper,

Charles Stodder.

The Auditing Committee on the accounts of the Treasurer and the Trustee of the Courtis Fund, reported that they were correctly cast and properly vouched.

It was voted, on motion of Mr. Binney, that the annual assessment be raised from three to five dollars.

Mr. Sprague presented, in book form, 160 of the 194 grasses of the northern United States.

The thanks of the Society were voted to Drs. Storer, Borland, and Durkee, and Mr. Whittemore, for their long and valuable services as Vice-President, and Curators of Herpetology, Microscopy, and Conchology, respectively.

The following communication was read: —

ON SOME SUB-PEAT DEPOSITS OF DIATOMACEÆ. BY ARTHUR M. EDWARDS, NEW YORK.

In June, (1859,) I presented to the Society a paper on a semifossil deposit of fluviatile Diatomaceæ from near the city of Milwaukee, Wisconsin; I have since learned the following particulars respecting the position of that deposit. A railroad embankment was carried through a bog; the embankment settled, crowding up and inverting the bog, — a common occurrence. For this information, as well as for the specimens, I am indebted to Mr. Stodder, and from him I have received specimens of three other deposits, — one from Bemis Lake, N. H., discovered by Dr. S. A. Bemis, one from Hingham, Mass., discovered by T. T. Bouvé, Esq., and one from Cambridge, Mass., discovered by Mr. Stodder himself. I am also indebted to Mr. E. Samuels and Dr. A. Shurtleff for specimens of a deposit discovered by the last-named gentleman at Brookline, Mass. Mr. Samuels has also sent me mounted specimens of deposits from Derry and Maidstone, Vt., from the Bailey collection in the possession of the Society. To these I have to add a deposit of Diatomaceæ which I have detected at Baisley's Pond, Long Island, N. Y. The consideration of such forms, occurring in the deposits, which I have, as yet, been unable to identify, I will postpone until some future time.

The *Bemis Lake* earth is a true sub-peat deposit, and much resembles those found in different parts of this country; as that discovered by Bailey at West Point, and those from different parts of Massachusetts, discovered by Hitchcock. Of this Bemis

Lake earth Mr. Stodder writes me as follows: "It was found under a few feet of water, uncovered by any earth — the white siliceous deposit showing through the water." This is rather a remarkable fact, showing that the once superimposed peat has either been removed or changed into diatomaceous earth by the decay and removal of its organic matter. It contains so very little beside the siliceous shells of the Diatomaceæ, that it requires but once boiling in nitric acid, and elutriation by means of water, previous to mounting in Canada balsam. The species found in it are the following:

Cocconema parvum,	*Navicula serians,*
Cyclotella Kützingiana,	*Pinnularia major,*
Cymbella cuspidata,	" *stauroneiformis,*
Eunotia serra,	" *tabellaria,*
Gomphonema acuminatum,	" *viridis,*
Himantidium gracile,	*Stauroneis phœnicenteron,*
Navicula affinis,	*Surirella biseriata,*
" *cuspidata,*	" *linearis,*
" *firma,*	*Tabellaria fenestrata,*
" *interrupta,*	" *flocculosa.*
" *rhyncocephala,*	

There is a *Nitzschia* occurring in this deposit, of which, as I have found it in a living state at a different locality, and as I consider it as yet undescribed, I shall at some future time speak more fully.

The *Cambridge* earth, Mr. Stodder informs me, occurs under the following circumstances: "There is a deep bed of clay, over that a few inches (4 to 6) of white sand, in which I could not find a single Diatom; over that one or two inches of reddish earth, probably mostly decomposed vegetable matter, and containing the Diatoms and *Monadina;* over that, vegetable turf and roots. The ground was much broken and disturbed; the above was as near as I could make it out. The locality is but a foot or two above the level of a neighboring pond, and was no doubt a swamp." The species found in it are:

Eunotia serra,	*Pinnularia lata,*
Himantidium bidens,	" *major,*
" *gracile,*	" *tabellaria,*
Navicula firma,	" *viridis,*
" *gibberula,*	*Stauroneis phœnicenteron,*
Orthosira orichalcea,	*Synedra radians.*

Though the number of species in this deposit is not great, it is remarkable for the curious distortion which many of the individuals appear to have undergone, whether from the influx of salt water, (a likely occurrence, considering the locality,) or from other causes, it is difficult, if not impossible, now to determine. Two species, the largest, seem to have been most affected ; these are *Pinnularia major*, which is very much distorted, and *Stauroneis phœnicenteron* ; *Himantidium gracile* has also, in some cases, been distorted, but not to the extent observable in the two larger species. Under the head of *Eunotia serra* I have in the above list included several forms having elevations (S. V.) varying in number from four to seventeen, as I am of opinion that they all constitute one species.

The *Brookline* deposit, Dr. Shurtleff writes me, occurs under the following circumstances: He says, "I found this under a bed of peat of from six to twenty feet in depth ; it was in the form of a stratum of marl, with roots or remnants of roots permeating in every direction. The locality is in Brookline, about one half a mile from the nearest salt-water inlet, but in a meadow lying up on the high ground, many feet above the highest tide-water." The species detected in it are :

Amphora ovalis,
Cocconema cistula,
" *cymbiforme,*
Cyclotella Kützingiana,
Cymbella cuspidata,
Epithemia gibba,
" *turgida,*
Eunotia diadema,
Gomphonema acuminatum,
" *capitatum,*
" *constrictum,*
" *intricatum,*
Himantidium pectinale,
Navicula elliptica,
" *firma,*
" *rhomboides,*
Nitzschia sigmoidea,
Orthosira orichalcea,
Pinnularia acuta,
" *lata,*
" *major,*
" *mesolepta,*
" *nobilis,*
" *stauroneiformis,*
" *tabellaria,*
" *viridis,*
Stauroneis anceps,
" *gracilis,*
" *phœnicenteron,*
Surirella limosa,
" *nobilis.*

I have put down a form as *Surirella limosa*, (Bailey.) This species is figured by Brightwell (Mic. Jour. 1859) as founded by Bailey ; after a careful search, neither Mr. Stodder nor myself can find any allusion to such a species among the papers of Bailey. It however is a distinct species, and may well bear the name given to it. The *Pinnularia mesolepta* in this deposit has invariably, as far as I have seen, a "stauros" or blank space on the valve similar to that in *P. stauroneiformis;* but I do not consider this enough to constitute a new species.

Of the mode of occurrence of the *Maidstone* and *Derry* deposits I know nothing, and introduce the lists of the species contained in them here for the purpose of comparison, and in the hope that more will be yet known concerning them. That from *Derry* contains the following species:

Cocconema cymbiferum.	*Navicula firma,*
" *parvum,*	" *obtusa,*
Cymbella Ehrenbergii,	" *serians,*
Epithemia gibba,	*Orthosira orichalcea,*
Eunotia falx,	*Pinnularia nobilis,*
" *tetraodon,*	" *viridis,*
Gomphonema acuminatum,	*Stauroneis gracilis,*
" *cuspidatum,*	*Tabellaria fenestrata.*
Himantidium gracile,	

Navicula obtusa (misprinted *obtusata* in Smith's Synopsis) has not hitherto been found in this country; neither has *Eunotia falx;* and I believe this is, as yet, the only locality here for either of them.

The *Maidstone* deposit contains the following species:

Cocconema parvum,	*Navicula serians,*
Cymbella Ehrenbergii,	*Pinnularia gibba,*
Eunotia tetraodon,	" *nobilis,*
Gomphonema intricatum,	" *viridis.*
Navicula cuspidata,	*Stauroneis phœnicenteron.*
" *firma,*	

There are also one or two species of *Himantidium* found in this deposit, but, as this branch of botany is at present in a very confused state, and I do not find them described in any reliable work on the subject, I refrain from giving them names. The habit of describing species from deposits is one that cannot be too strongly deprecated, tending as it does to crowd our Botanies with synonyms, not only useless, but really hurtful to the science. No new species can be correctly described from the dead plant alone.

The *Hingham* deposit was found on the estate of Mr. T. T. Bouvé, in an orchard, supposed to have been formerly a pond. It is six or eight inches in thickness, covered with a vegetable mould and earth, apparently washed down from surrounding high ground, of a foot or so in depth. There is, however, no peat present, all of that substance originally present having been changed into this white earth. This deposit was at first taken for clay; but "infusorial earths" are generally called "marls," even scientific persons not being acquainted with the difference between them and true marls. The species found in it are:

Cocconema lanceolatum,	*Navicula firma,*
" *parvum,*	*Pinnularia major,*
Gomphonema acuminatum,	" *nodosa,*
" *dichotomum,*	" *viridis,*
" *intricatum,*	*Stauroneis Baileyii,*
Himantidium arcus,	" *phœnicenteron.*
" *gracile,*	

That *S. Baileyii* is as distinct a species as many others cannot be doubted, but whether it will eventually be found to be only a variety of *S. acuta* is at present difficult to determine; and though, as I have already said, I am indisposed to admit species into our Botanies which have as yet only been found in a dead condition, I am of opinion that S. *Baileyii* will be proved to be a good species. It has as yet, I believe, been only found in this country.

The *Baisley's Pond* peat was thrown out in large quantities while making excavations for the Brooklyn waterworks, at Baisley's Pond, about 2½ miles south of the town of Jamaica, Long Island. There were, at the time, said to have been two millions of square yards of it thrown out, but I have since ascertained that the quantity would be more correctly represented by two hundred thousand square yards. Portions of the skeleton of a mastodon were found in the peat, but fell into powder soon after being exposed to the air. The species in it are:

Amphora ovalis,	*Himantidium bidens,*
Cocconeis placentula,	" *gracile,*
Cocconema lanceolatum,	*Pinnularia major,*
Cymbella cuspidata,	" *mesolepta,*
Gomphonema acuminatum,	" *viridis,*
" *cuspidatum,*	*Stauroneis phœnicenteron.*
" *vibrio,*	

I have one or two more deposits, beside the above, yet undescribed, and many more will doubtless be hereafter discovered; in fact, the number that have been found thus far show that Prof. Bailey was right when he said that deposits similar to that he found at West Point would be discovered under every pond and marsh in the country.

Mr. S. H. Scudder made some remarks upon the American white ant, the *Termes frontalis* of Haldeman.

Late in January of this year, a number of the males were sent to the Cambridge Museum by Mr. Allen, of Salem, who asserted that they had done much injury to the grape-vines in his forcing-houses; a week or two after Mr. Scudder visited the greenhouses, and found the dead males collected in large numbers upon the moisture covering the sashes above, and vast numbers of the workers and soldiers swarming under and within every damp piece of wood. Mr. Allen complained that they were not only destroying the ground beams of his house, but that it was impossible for him anywhere to "layer" a vine without the portion beneath the ground being entirely eaten through by the ants, (even several of his large vines, two and three inches in diameter at the ground, had died,) and that the roots upon examination had proved to be mere shells, the interior filled with these ants. Notwithstanding these representations of a careful and interested observer, he was inclined to think, from the well-known habits of *Termites*, that the true cause of the injury was some disease of the vine, and that the *Termites* simply carried away the rotten material. Within a few days, however, he had received the root of a vine, showing similar signs of death with those previously destroyed, which he exhibited to the Society; the whole root was thoroughly chambered by these *Termites*, the excavations being unmistakably carried into the solid living wood; an opening along one side showed the chambers penetrating an inch or more above the level of the ground. Upon a careful comparison of the soldiers and wingless males of this species with those of *Termes bellicosus* of Smeathman, he had ascertained that they were the representatives of distinct though closely allied genera. He believed that this was the first time that any species of *Termes* or an allied genus has been proved to attack living vegetable matter so as to cause its destruction; for, although Smeathman asserts that they do sometimes feed on living plants, Dr. Savage states that trees and shrubs are frequently seen growing through the nests of the *Termites*, yet always alive. A colony of these ants had been kept by Mr. Scudder for some months in a pot with moist earth and rotten wood. On examination it proved that the whole surface, to the depth of two or three inches, was completely riddled with minute passages, about large enough to allow one of these ants to pass another.

Dr. C. T. Jackson announced that a memorial had been sent to Congress by the Committee appointed at the last meeting, in relation to the Oregon meteorite, praying that it might in whole or in part be placed in the Smithsonian Institution, and be thence distributed to scientific bodies.

Messrs. David Loring and Charles W. Morris, of Boston, were chosen Resident Members.

The Annual Meeting was then adjourned to Friday, May 11, at 8 P. M., to hear the Annual Address by Prof. Wm. B. Rogers, in the Hall of the Mechanics' Charitable Association in Bedford Street.

May 11, 1860.

The President in the Chair.

The Society met by adjournment, and listened to a most eloquent and pertinent address from Prof. Wm. B. Rogers, on the progress of Natural Science for the last thirty years, dating from 1830, the year in which the Society was organized. A large, highly intelligent, and enthusiastic audience honored the occasion with their presence, and the Society had great reason to be proud of this successful and brilliant revival of the observance of their Annual Address.

May 16, 1860.

The President in the Chair.

On motion of Dr. C. T. Jackson, a vote of thanks was passed to Prof. Wm. B. Rogers for his very able and eloquent address on the occasion of the adjourned Annual Meeting of May 11, and a copy was requested for publication.

The Corresponding Secretary read the following letters, viz.: —

From the Society of Natural Sciences of Wurtemberg, the Geographical Society of Paris, the Royal Society of Sciences of Liege, and the Smithsonian Institution, acknowledging the reception of the Society's publications; from the Wurtemberg Society, the Entomological Society of Stettin, the Royal Society of Liege, the Royal University of Christiania, and the Geological Survey of India, presenting their publications.

A letter from Mr. Chas. F. Hartt, of Wolfville, N. S., in relation to minerals and fossils of the British provinces, was referred to the Curators of Geology and Mineralogy.

Dr. John Bacon presented the following report on the "cocoa-nut pearl" referred to him for examination.

A singular gem from Singapore, called a "cocoa-nut pearl," was exhibited by Dr. C. F. Winslow at the meeting on February 1st, and was referred to me for microscopical and chemical analysis. The partial examination which I have been able to make shows that the body is an interesting one. Its origin was not known to the owner by personal observation, but it was said to be a concretion of very rare occurrence, formed in the interior of the cocoa-nut. Through the politeness of the owner, Frederic T. Bush, Esq., I was requested to use one half or more of the pearl for analysis. As a section passing through the centre was desirable, I had it so divided by a lapidary, and employed one half for making several sections in different directions for examination under the microscope and for chemical analysis. The remaining half, now exhibited, has been reset in the ring, and presents the same appearance as formerly.

The peculiar characters of this gem are most readily described by comparison with those of animal pearls, which it resembles in many respects. It is about one quarter of an inch in diameter, and of a spherical shape. Its surface, evidently a natural one, is smooth, and of a milk-white color, with little lustre. On close examination, the surface appears mottled, and faint undulated markings are seen within. In hardness it much exceeds true pearls, equalling feldspar, or the average hardness of opal. The hardness of pearls varies to some extent. Several specimens of different species which I had an opportunity to test ranged between calcite and fluor-spar; none were so hard as fluor.

Chemical composition. The cocoa-nut pearl consists of carbonate of lime, with a very small proportion of organic matter; so little that it does not blacken nor evolve any odor before the blowpipe. When the carbonate of lime is removed by the slow action of very dilute acids, a transparent substance remains, of great tenuity, showing no structure under the microscope, and incapable of preserving its form. Notwithstanding the filmy character of the organic residue, a few micro-chemical reactions were satisfactorily obtained. It is insoluble in water, alcohol, and ether. With strong nitric acid it takes a yellow color, and on adding ammonia becomes intensely yellow. Iodine colors it brownish yellow, and the addition of concentrated sulphuric acid does not change the color to blue, the tint given by iodine being retained a week or more. These reactions are sufficient to indicate that the organic substance is an albuminous body, and not cellulose, the basis of vegetable tissues in general. Since albuminous substances occur in plants as well as in the animal kingdom, we cannot from these reactions infer the animal origin of the gem in question. True pearls consist of carbonate of lime, with a considerable amount of albuminous animal matter. When decalcified by dilute acids, the organic residue retains the form and structure of the pearl; and in the nacreous pearls, the characteristic iridescence also.

Microscopical characters. Thin sections examined under the microscope show that the cocoa-nut pearl is composed of numerous regularly concentric laminæ, adhering pretty firmly together. These layers form groups differing slightly in tint, and near the exterior are often exceedingly thin. The centre is occupied by a semitransparent mass resembling the surrounding layers. No foreign nucleus was found. The general mass is made up of radiating bands of crystalline fibres, inclined at different angles in contiguous bands. In the outer layers, the crystalline structure becomes strongly marked with rhombohedral cleavage. Probably the great hardness of this pearl depends upon the peculiar crystalline arrangement, with a little organic matter binding the whole firmly together.

Pearls exhibit two principal varieties of microscopic structure. The true or nacreous pearl is formed of concentric laminæ of nacre, and shows a finely furrowed surface, and no radiating lines within. The markings of the nacreous membrane, by which iridescence is produced, are faintly visible in the sections as very fine undulated and dotted lines. In the second variety of pearl, a prismatic cellular structure occurs. These pearls exhibit well-marked radiating lines, as well as concentric layers. In many specimens of pearl, both varieties of structure are found. The cocoa-nut pearl presents a general resemblance in microscopic characters to the second variety, but differs essentially in the details of structure, as is evident from the sections now exhibited of pearls from pearl oysters and from freshwater clams, — showing the nacreous and prismatic varieties, and combinations of both.

I cannot find that any species of pearl or other concretion resembling this has been described. Nor could I learn from our best botanical authorities that any concretion is known to occur in the cocoa-nut. The milk of this nut contains, according to the reported analyses, a little phosphate and malate of lime, but no carbonate; nor is the carbonate found in any part of the nut. Possibly an analysis of the immature nut might give a different result. The only concretions of vegetable origin which approach this in composition and structure are the cystolithes found in the leaves of Urticaceæ, and some other families of plants. These are minute bodies, showing concentric lamination. But they consist of a matrix of successive layers of cellulose, upon which crystalline masses of carbonate of lime are deposited in a kind of efflorescence; a wholly different mode of formation.

In the animal kingdom, several kinds of concretions besides pearls bear more or less resemblance to this body in composition and structure; especially the concretions of carbonate of lime formed in the bladders of herbivorous animals, in which more or less animal matter is always combined with the salt of lime.

Numerous concentric layers and a radiated crystalline structure are frequently visible. The organic matter is usually in small proportion, though often sufficient to preserve the original form and structure when the carbonate of lime is removed by acids; occasionally there is more animal matter than in true pearls.

It is to be regretted that the origin of the cocoa-nut pearl is not certainly known, since neither the chemical nor microscopic characters are sufficient to point out its source and mode of formation. Were the statement of its origin perfectly reliable, it might be regarded as the product of a diseased condition of the nut. The concentric lamination might seem to require a longer time than the rapid growth of the cocoa-nut would admit of, but in the case of animal calculi of similar chemical composition, and of such as can be made artificially, these layers, whether resulting from successive depositions or from a process of segregation, may be rapidly formed. A few weeks, and sometimes only a few hours, are sufficient for the production of numerous laminæ.

Prof. Rogers presented, in the name of Mr. Urbino, a work by H. Wagner on cryptogamic botany with herbarium, and a work on *Juncaceæ*, *Gramineæ*, &c.; he also presented from R. B. Forbes, Esq., the half of a large geode from Uraguay, consisting of chalcedonic quartz, very flint-like on the outside; the thanks of the Society were voted for these donations.

The President observed, in reference to the last specimen, that such geodes, and agates, are very abundant in that region, but that they are not in place, having been transported by the river from the north. This was obtained at Salto.

Mr. A. T. Lyman having resigned the curatorship of Conchology, Dr. Gould, Mr. Whittemore, and Dr. White were chosen a Committee to nominate a candidate for the office.

The President gave an account of some dissections which he had recently made of the poison apparatus of the rattlesnake.

He had not found the connection of the duct and the poison gland to correspond with the descriptions usually given. The duct proper does not reach the opening at the base of the tooth, but ends at a short distance from it. The communication beyond this is made by means of the sheath of the tooth, which is too loose to prevent the poison from escaping around the exterior of the tooth instead of entering its canal, were it not for the circumstance that, as the tooth is protruded, the sheath is crowded back, and thus made to fit tightly the circumference.

He had seen a rattlesnake, when held in such a manner as to prevent its striking, discharge the poison in a simple jet to the distance of several inches. He also mentioned the habit which the rattlesnake is known to have of living in company with other animals. While recently in Florida, he had found two large rattlesnakes and an opossum living in the same nest with the wood rat.

Prof. Rogers presented a specimen of shale with adhering coal from the Albert Mine, New Brunswick, obtained from the depth of 460 feet, as illustrating the geological position of the material.

The coal is seen to be attached to the edges of the layers of rock, and not parallel to them. Throughout the greater part of the mine the direction of the bedding of the slates makes a considerable angle, and is sometimes nearly perpendicular to the course of the coal. This and the jagged form, and other irregularities of the walls, satisfied him that this deposit is not a true bed or seam, but is material which has been accumulated in a *fissure or fracture* of a date subsequent to the formation of the bituminous shales and other carboniferous rocks of the region. The neighboring strata are heavily charged with bituminous or asphaltic matter, and may easily be conceived to have furnished, by some process of distillation or mechanical conveyance through the influence of gentle heat, the pure combustible material which fills this and other local fissures of the neighborhood.

In the very substance of the coal are sometimes found imbedded fragments of rock like the sides of the vein, evidently having fallen down during its deposition.

He also presented a specimen showing in what manner the laminæ of the slates have been warped and twisted by mechanical causes, indicating great disturbance. When a coal has been powerfully dislocated after deposition, it presents a structure like the contorted and disturbed slates which surround it. No such structure is to be detected in the Albert deposit.

Dr. Jackson observed that these rocks are everywhere bituminated for miles, and that these veins of coal, in his opinion, are of the same age as the rocks that contain them. The coal is very much changed, 85 per cent. being true coal, and 15 per cent. only bitumen. Bituminous springs are common, bituminous films being deposited on the soil; he agreed with Prof. Rogers that it was not a regular deposit, but rather an exudation than a distilled product.

Prof. Rogers remarked that the oil wells of northern Pennsylvania are generally in deposits of the same age as the Albert coal, *i. e.*, they come up through the rocks below the coal measures, which are older than the carboniferous limestones, and which are there the surface rocks of the country.

Dr. Jackson, from finding fossil plants and fishes, regarded these deposits as belonging to the lower coal series; if originally bituminous, the coal has undergone great changes, for we find every grade from the coal oil to the Albert coal (softening at the temperature of melting zinc), and even to anthracite; he considered the Albert coal one stage higher than cannel in the scale of bituminization.

Prof. Rogers maintained that the carboniferous limestone intervenes between the geological horizon of the Albert coal and the true coal measures; and that this coal, though belonging to the lowest carboniferous series, is far below the proper coal measures or the group of the great productive coal rocks of the Appalachians and Nova Scotia.

The following Standing Committees were appointed by the Council for 1860–61: —

On the Library. Messrs. C. K. Dillaway, C. J. Sprague, and J. Bacon.

On PUBLICATIONS. Messrs. C. K. Dillaway, S. L. Abbot, J. Wyman, S. Kneeland, Jr., and A. A. Gould.

On FINANCE. Messrs. T. T. Bouvé, J. M. Barnard, and A. Binney.

June 6, 1860.

The President in the Chair.

Mr. P. B. Du Chaillu presented descriptions of five new species of mammals discovered by him in western equatorial Africa, as follows: —

1. TROGLODYTES CALVUS, (Du Chaillu,) sp. nov.

Description of an adult female. Head entirely bald to the level of the middle of the ears behind; scalp black, smooth, and shining; eyebrows thin, bristly, long and black; face black; eyes somewhat sunken; nose flat; sides of the face hairy from the ears, the hair very short; short, scanty beard under the chin, mixed with a few gray hairs; ears large, somewhat smaller than in the chimpanzee, standing out laterally from the head.

General color: the body in front with thin, blackish hair; neck, arms, and upper two thirds of the back with long, thick, black hair; lower third of the back light brownish gray; legs of the same color as the lower third, mixed with black in front; hands and feet black, and hairy on the back to the beginning of the fingers and toes. External genital organs prominent as in the dog, bare, wrinkled, and flesh-colored. Height in erect position, 43 in. Width across the shoulders, 18 in. Circumference of the chest under the arms, 36 in. Length of the arms, (reaching to the knees,) to the end of the fingers, 29 in. Length of the forearm, 11 in. Length of the hand, 8 in.

The female, of which the above is a description, was killed with a young one having a very white, pale face, and which, though not possessing any distinctive baldness, had the hair on the head exceedingly thin. In other young specimens the baldness could be seen, though not extending so far back as in the adult specimen. As the animal grows older, the hair becomes gray. A male was killed four feet four inches in height, gray, and having the lower third of the back almost bare of hair.

The external characters of this animal are so different from those of *T. niger*, (chimpanzee,) and from those of the gorilla, that it may be considered a new species of the genus *Troglodytes*, for which I propose the name of *T. calvus*.

The most striking external character which distinguishes the *T. calvus* from the *T. niger* (to which alone it can be compared) is the entire baldness of the head, which was seen in the four specimens killed, both male and female; the very young are not bald, but the hair on the head is very thin.

The *T. niger* has also a very black face, but the young is of a darker flesh-color than the young *T. calvus*. The *T. niger* is rare in the countries which I have explored, with the exception of the Gaboon, Moonda, and Muni rivers, where it is more abundant than south of the equator, where I have been; I killed but one, near Cape Lopez; I saw another which had been killed by the natives in the Camma country, which presented the same external characters as the one I killed at Cape Lopez.

The natives of the Camma country call the *T. niger* "*Nschiego*," and the *T. calvus* "*Nschiego Mbouvé*," the latter meaning something like another tribe of the Nschiego. The Mpongwé called the *T. niger* Nschiego, or the N'chego of Dr. Franquet. The *T. calvus* builds a shelter made with the branches of trees, elevated generally from twenty to thirty feet; they tie together with wild vines the branches they have collected, and there is below the shelter (which has the shape of an umbrella) a horizontal branch on which they rest; this horizontal branch is always the first from the ground. The male lives under one shelter, and the female under another, on a neighboring tree.

I am aware that Dr. Franquet, of the French navy, who resided at the Gaboon River, mentioned in a letter, dated Brest, December 1, 1852, addressed to M. Is. Geoffroy St. Hilaire, (and published in the *Archives du Muséum d'Histoire Naturelle, tome* X., *livraisons* 1 and 2,) that there are three species of anthropoid apes in Western Africa. The following are extracts from this letter: (p. 93,) "At Gaboon I saw a number of chimpanzees, all coming from the peninsula between the rivers

Moonda on the north and Gaboon on the south; not one *T. niger* came (as far as I could ascertain) from the left bank of the Gaboon, *i. e.* from the locality whence are obtained the gorillas and the nschiego." * * * P. 94, "The Mpongwés, or the natives of Gaboon, call the gorilla N'gena (and not Enge-ena), while they give the name of N'tchego (and not Enge-eko) to an ape smaller than that whose adult skeleton I sent to the Museum; I do not know what name they give to the chimpanzee; supposing (which is little probable) that they call also the chimpanzee N'tchego, would this show that they confound under this name two species? I think not. I believe there are on the coast of Africa three distinct species of anthropoid apes: 1. the chimpanzee (*T. niger*, G. St. Hilaire), with a naked, flesh-colored face, ears large and red, the hair black and thin, &c. &c.," — 2. the gorilla, which he describes, — "and 3. the N'tchego," which he goes on to describe as follows: "It has a black face and small ears like the gorilla, and the hair is shorter and darker colored; it never attains the size of the gorilla, and never has the reddish streak which has been mentioned; the antero-superior crest of the adult cranium is barely, if at all, visible. The muzzle is less prominent than in the gorilla, giving to the face a more human expression than in any other ape. I do not remember all the minor differences of anatomical detail, but only the striking characters which could not escape the least attentive observer. The N'tchego is no more the gorilla, than is the latter the chimpanzee; on this I insist, as I believe I am the first to advance the opinion that there are three anthropoid apes on the African coast."

After a careful examination of this letter, I am forced to the conclusion that the N'tchego of Dr. Franquet is nothing but the adult chimpanzee (*T. niger*). The chimpanzee is found north and south of the equator, and consequently north and south of Gaboon, and near Loango becomes very abundant; it may be said to occupy almost the whole range of the western coast of Africa, between the tropics.

Dr. Franquet speaks of the chimpanzee (*T. niger* of Geoffroy St. Hilaire) as having the face flesh-colored. This color belongs incontestably to the young chimpanzee, for the old ones, and even those that are not quite full grown, have a black face; this, I think, accounts for the error made by Dr. Franquet, that he had seen a different species. I have killed an old chimpanzee at Cape Lopez (of which I have the specimen) whose face was entirely black, and whose head was covered with hair; and I saw another one that had been killed by the natives in the Camma country presenting exactly the same appearance as the first; consequently I am led to the conclusion that the third species of Dr. Franquet is not the *T. calvus*, for he would not have forgotten to mention, and certainly would have observed, the entire baldness of the head, which is the most striking feature of the animal. The *T. calvus* also has large ears, like those of the *T. niger*. The *T. calvus* I have thus far found in the interior, south of Cape Lopez, but I suppose it has a wider geographical range.

2. TRAGELAPHUS ALBO-VIRGATUS, (Du Chaillu,) sp. nov.

This large bovine antelope is found in the Ashankolo Mountains, 60 miles south of the equator and 140 miles from the coast; it probably belongs to the genus *Tragelaphus;* it is called "Bongo" by the natives.

Description of a male, the smallest seen in a herd of eight. General color bright orange rufous; chestnut patch between horns and eyes, extending two inches below the eyes, with rounded edge in front. Below this a white crescent an inch wide, divided in the middle by a dark brown stripe which extends in the median line to the muffle. Sides of the face below, light wood-brown, shading into yellowish rufous on the cheeks to just beyond the eyes. On the cheeks, below the eyes, a white patch divided into two lobes, of which the upper is about $2\frac{1}{2}$ inches long, and the lower $1\frac{1}{4}$ inches. Muffle black and bare, with a few long bristles on each side of the nostrils; the upper lip white and hairy, except a narrow space on the median line; tear-bag not distinct, but in its place a bare space, — in this respect diverging from the typical species of *Tragelaphus*, and coming near the genus *Oreas*. Under lip white; throat with longer, shining black hair, for about a foot in length and $3\frac{1}{2}$ inches in width in the middle, diminishing in a rounded point above and below; the white spots on the cheeks extending to the edge of this gular spot. Ears ox-like, rufous, and lined on the inside with long white hair. Neck, above and below, bright rufous, with a white crescent at the lower part, sixteen inches in its transverse extent, two inches wide in the middle, and diminishing to a point at each end. A median line on the neck above with dark rufous hair, slightly elongated, and whorled at the lower part, the hair very slightly longer and pointing upward. Below the whorl for four inches and to first dorsal stripe, thin, long, dark rufous hair mixed with a few black ones, two inches long, not erect. Back with a very narrow white median line from between the first dorsal stripes, or the middle of the shoulders, to within three inches of the tail, mixed with a few dark hairs at its upper portion. From the median line extend, on the right, fourteen white stripes, and on the left fifteen, extending on both sides to within three inches of the median line of the abdomen; stripes about half an inch in width, the first one over the fore legs, and that of one side meeting the other; below this seven stripes on the left and six on the right, irregular, not opposite each other; below these again opposite each other to the last; the last stripe but one running down to the upper part of the hind-legs. and the last extending down the back of the nates. Tail rounded, sixteen inches long, thinly covered with rufous hair of the general color of the body, ending in a tuft of longer hair of somewhat darker rufous. From between the fore-legs to lower third of the abdomen on the median line, a patch of soft hair of purplish brown color, four inches in its greatest width on either side; on the lower third of the abdomen, and between the hind-legs, the skin is bare of hair, and of milk-white color, extending between the legs, growing narrower to the anus.

Fore-legs: upper part in front bright rufous, ending in a ring behind. The front of the fore-leg below, blackish, mixed with rufous extending to false hoofs, then interrupted by a white spot an inch wide, and then again narrowly encircling the hoofs. The posterior part of the fore-leg white, with the exception of the rufous ring on the forearm and another on the middle of the metatarsus, the latter of a darker color extending on the median line quite to the true hoofs. Hind legs rufous behind and blackish between the false and true hoofs, anterior surface white, with a rufous ring just above the knee, and another ring mixed with black at the point of the false hoofs; just above the true hoof a narrow ring of dark encircling the limb at this point. False hoofs small, and, with the true hoofs, black; width of the hoof two and a half inches.

Horns sublyrate, ringed at the lower portion, and spirally twisted, keeled below, and ridged externally. Space between the horns at their origin two inches; at the tip six inches; greatest width, measured from the outside, twelve and three fourths inches; length of the horn in a straight line sixteen inches; along the curve outside nineteen inches. Horns black, upper three inches yellow horn-color, smooth, polished, and very pointed.

The animal equals in size the largest antelopes, and is certainly the handsomest yet discovered; it is graceful, though somewhat heavy, and is exceedingly shy; it is also considered by the natives very rare. It is found about the head waters of the Fernand-Vaz, in the immense forests of the interior; it does not occur on the maritime plains or flat country between the table-land and the sea. In coloration it somewhat resembles the *T. euryceros*, Gray.

3. Potamochœrus albifrons, (Du Chaillu,) sp. nov.

Description of an adult male. Ground color bright red bay. Head white; a triangular black space, the base between the ears and ending in a point on the median line, about three inches below the eyes. Face elongated, with a black, warty protuberance on each side half-way between the nose and eyes, and in front a circular black line extending nearly to the angle of the mouth; nose black; round the eyes long black bristles; eyes surrounded by a white line three fourths of an inch wide, of the general color of the head interrupted by bay opposite the ears; from the ears a black stripe mixed with rufous hair coming down the cheeks; whiskers long, white at the base and reddish at the end, forming a whitish stripe behind the black stripe of the cheeks; ears elongated, suddenly tapering and ending in a long pencil of hair of whitish color mixed with black; borders of the ears black. Median line a narrow white stripe, ending at the root of the tail, the lower hair long and mixed with black. Under the jaw whitish, with a few scattered black hairs; at the angle of the mouth a black band encircling the jaws. Fore-legs in front black mixed with rufous; behind of the general color of the body. Hind-legs: black ring round the heels; metatarsus black in front. False hoofs large and long. Tail straight and long, of the general color of the body, and ending in a tuft of black hair. From the tip of the nose to between the eyes, 10 in. From nose to between the ears, 15 in. From point of the nose to root of the tail, 50 in. From the root to the end of the tail, 19 in. Length of the tuft, 4 in. Length of the ears measured in front, $7\frac{1}{2}$ in. Ears with the pencil, $12\frac{1}{2}$ in.

This species is different from the *P. penicillatus*, (see Proceedings of the Zoölogical Society of London, 1852, page 129). The most striking difference is in the color of the head; this in the latter being black, but white in this species; in the latter the tail is black, while in this it is red and tufted with black hair at the end.

The *P. albifrons* is found in all the countries I have explored, in the interior and in the high table-lands, and is very abundant between Cape Lopez and Cape St. Catherine, and on the head waters of the Fernand-Vaz River.

4. Genetta Fieldiana, (Du Chaillu,) sp. nov.

Description of an adult male. Ground yellowish gray; body covered with brownish black spots. Top of the head rufous, mixed with gray, running to a sharp point a little below the eyes; whiskers long and white, some of them brown at the base, and some of the shorter ones entirely brown; ears cinereous with dark hair at the base; cheeks cinereous mixed with rufous; four dark spots, somewhat in a circle, an inch beyond the angle of the mouth, just under the ears; circle round the eyes dark brown, under it a white spot running toward the nose; sides and front of the nose white; chin and throat cinereous. On the neck above, behind the ears, two longitudinal bands, brownish black mixed with a little rufous, running backward and outward over the shoulders behind the fore limbs; between these an indistinct median band of the same color, soon becoming double and diverging, and between the shoulders dividing into five longitudinal bands, of which the median is continuous to the base of the tail, increasing gradually in width; the two laterals on each side broken up into five or six smaller longitudinal spots; on the flanks a row of seven or eight spots of the same blackish brown color. All the lower parts from the throat cinereous white, tinged with yellow on the abdomen; on the upper part of the breast a few indistinct pale purplish spots. Fore-legs cinereous, tinged lightly with brownish yellow, with a few purplish brown spots on the outside extending to the feet. Hind-legs: thighs marked like the back, but with spots more rounded and smaller; inside of the hind-legs unspotted, with a light brown tinge; about genito-urinary organs whitish. Tail well developed; with seven dark brownish black rings, the first incomplete below and the last indistinct; the last five inches dark brownish black; above and below six gray rings, lighter underneath; the last ring not well marked. Length, 21½ in. Length of tail, 20 in. From the muzzle to the middle of the ears, 3½ in. From the muzzle to the eyes, 1¼ in.

This species differs from the *G. Poënsis* (Waterhouse.) The latter has dark brown legs; the fore limbs of this new species are also spotted in front, and the tail is almost of the same length as the body. It differs also from the *G. servalina*, (Pucheran,) which has no median stripe, and is also of a more brownish color, the legs being also blackish.

I propose for this species the name of *Genetta Fieldiana*, in honor of our distinguished fellow-citizen, Cyrus W. Field, as a token of friendship. This beautiful and rare species inhabits the country of the interior south of the equator.

5. Anomalurus Beldeni, (Du Chaillu,) sp. nov.

General color above, including the flying membranes, a mixed black and yellowish cinereous, arising from each hair being black at the base and tipped with yellowish or rufous white. On the back the hair is tipped with bright rufous, which gives a rufous tinge from behind the ears to the lower third of the body on the median portion to the commencement of the membranes. Whole head above hoary, mixed with light brown; sides of the head, to behind the ears, brownish black, darkest behind the ears and lightest about the nose. Under throat lighter brownish black mixed with light cinereous, gradually shading into the dirty yellowish white of the upper parts; a light yellowish cinereous spot under the ears. Abdomen dirty yellowish white; under surface of membranes scantily covered with light yellowish brown hair. Outside of limbs blackish brown, more or less mixed with hoary; inside of limbs below the membranes lighter. Upper part of tail above and sides like the lower back, but mixed with more yellowish white; rest of tail black, the hair gradually increasing to a tuft at the end; shape of the tail rounded. Teeth large and narrow, deep orange yellow; whiskers black, and about four inches long; ears long, rather pointed and bare, surrounded at the base with long brownish black hair; claws curved and sharp, four on the fore and five on the hind feet, covered above, especially on the hind feet, with long jet-black stiff hair. Extending from the root of the tail below, for about three inches and a half, sixteen scales of a pale horn-color, arranged in two longitudinal series alternating with each other, and decreasing in size downward; the scales sharp-pointed and prominent. Length from tip of the nose to root of tail, 15 in. Length of the tail, 11 in. Length from the tip of the nose to base of the ears, $2\frac{1}{2}$ in. Length from the tip of nose to the eyes, $1\frac{1}{5}$ in. Length of the horny part under the tail, $3\frac{1}{2}$ in.

This animal is nocturnal, and inhabits the forests, and is consequently exceedingly difficult to get; during the day they stay on the branches of dead trees, surrounded by a great number of dead vines. This is the only specimen I met with.

I propose for this new species the name of *Anomalurus Beldeni*, in honor of George Mortimer Belden, Esq., as a token of friendship from one who remembered him often while in the wilds of equatorial Africa.

The chief peculiarity of this species is the two distinct colors of the tail which ends in a tuft.

This makes four species of *Anomalurus*, which are these:

A. Fraseri (Waterhouse).
A. Pelii (Temminck).
A. Beecrofti (Fraser).
A. Beldeni (Du Chaillu.)

Dr. C. T. Jackson presented the following analysis of the juice of the leaf-stalks of the garden Rhubarb (*Rheum rhaponticum*).

The leaf-stalks, by pressure, yield 90 per cent. of clear juice, and 10 per cent. of cellulose and fibrous matter. 1000 grains of the filtered juice, on evaporation, yield 31 grains of solid extract; this, burned, leaves 3.3 grains of ashes, or the saline matters of the plant converted mostly into carbonates of the alkali and lime.

The ashes, analyzed, yielded

Potash	1.717
Phosphate of lime	0.350
Lime	0.002
Carbonic acid	1.200
	3.269

1000 grains of the filtered juice, analyzed for the acids, saccharine matter, and mucilage, gave

Oxalic acid	3.53
Malic acid	7.30
Glucose or grape sugar	9.63
Mucilage	3.30
	23.76

The oxalic acid is combined with potash as the binoxalate of potassa, but there is a slight excess of acid over the quantity required for the base. The malic acid, with the exception of the small proportion required for saturation of $\frac{2}{1000}$ grains of lime, is in a free state.

It has long been known that the juice of the rhubarb stalks is the best source from which we can obtain malic acid. This juice has been employed to make an imitation of Champagne wine, but the absence of cream of tartar renders it unfit for that purpose, and the so-called wine is more like cider, the malic being the characteristic acid present.

Dr. T. M. Brewer presented the following list of the birds of Cuba, compiled from two lists furnished by Dr. John Gundlach, of Havana.

One of these, bearing date of October, 1855, contained a list of all that had been observed up to that time, whether visitants or residents ; the other, written in February, 1860, gives only the birds known to breed in the island. These would probably have been more complete, if the list of 1860 had not been restricted to resident birds, but had also referred to migratory visitants. In a few instances, where the species has been ascertained to be different from Dr. Gundlach's supposition, he has taken the liberty to change the nomenclature. The list comprises 251 birds.

* Birds, the eggs of which have been obtained.
† Birds, the nest or young of which have been obtained.
‡ Birds resident on the island throughout the year, but whose breeding on the island is inferred.

* Cathartes aura, *Illig.*
Falco anatum, *Bon.*
Hypotriorchis columbarius, *L.*
* Tinnunculus sparverius, *L.*
* ? " sparveroides, *Vig.*
* ? " Dominicensis, *Bris.*
Accipiter fuscus, *Gmel.*
† ? " fringilloides, *Vig.*
† " Cooperii, *Bon.*
" pileatus, *Pr. Max.*
" Mexicanus, *Sw.*
† Buteo borealis, *Gmel.*
† " Pennsylvanicus, *Wils.*
Nauclerus furcatus, *L.*
‡ Rostrhamus sociabilis, *Vieill.*
‡ " hamatus, *Illig.*
Cymindis uncinatus, *Illig.*
Circus Hudsonicus, *L.*
‡ Regerhinus Wilsonii, *Cass.*
‡ Pandion Carolinensis, *Bon.*
* Polyborus cheriway, *Jacq.*
* " vulgaris, *Wils.*
* " tharus, *Molina.*
* " Brasiliensis, *L.*
* Hypomorphus Gundlachi, *Cab.*
* Strix furcata, *Temm.*
‡ Otus siguapa, *Orb.*
Brachyotus Cassinii, *Brewer.*
* Ephialtes nudipes, *Daud.*
* Glaucidium Sijii, *Orb.*
* Chordeiles Gundlachi, *Lawrence.*
* Antrostomus vociferus? *Wils.*
* Tachornis gradii, *Lemb.*
Hirundo rufa, *Gmel.*
* Petrochelidon fulva, *Vieill.*
" bicolor, *Vieill.*
* Progne purpurea, *Boie.*
Cotyle riparia, *L.*
† Cypselus collaris, *Pr. Max.*
† " niger, *Gmel.*
Ceryle alcyon, *L.*
Mellisaga colubris, *L.*
* Arbelorhina cyanea, *L.*
* Chlorestes Ricordii, *Gmel.*
‡ Orthorhynchus Helenæ, *Gundl.*
Culicivora cærulea, *Bon.*
* " Lembeyii, *Gundl.*
Enicocichla aurocapillus, *Lath.*
" major, *Cab.*
‡ " Noveboracensis, *Gundl.*
Mniotilta varia, *L.*
Sylvicola coronata, *Lath.*

Sylvicola striata, *Lath.*
" pensilis, *Lath.*
" virens, *Lath.*
" maritima, *Wils.*
* " æstiva, *Gmel.*
" petechia, *Lath.*
" Americana, *Lath.*
" Canadensis, *L.*
" maculosa, *Lath.*
" discolor, *Vieill.*
‡ " pityophila, *Gundl.*
Helenaia vermivora, *Lath.*
" chrysoptera, *L.*
" Bachmani, *Aud.*
" peregrina, *Wils.*
Trichas Marilandica, *Bris.*
* Galeoscoptes rubripes, *Temm.*
Turdus mustelinus, *Gmel.*
" Wilsoni, *Bon.*
" Swainsoni, *Cab.*
* Mimus polyglottus, *L.*
‡ " Gundlachi, *Cab.*
" Carolinensis, *Licht.*
† Myiadestes Elizabeth, *Lemb.*
† Melittarchus magnirostris, *Cab.*
* " Dominicensis, *Bris.*
* Tyrannus caudifasciatus, *Orb.*
" intrepidus, *Vieill.*
" crinitus, *L.*
* Myiarchus stolidus, *Gosse.*
" Lembeyii, *Gundl.*
" virens, *Gmel.*
" pusilla, *Sw.*
* Blacicus Caribæus, *Orb.*
Setophaga ruticilla, *L.*
" mitrata, *L.*
" formosa, *Wils.*
Vireo flavifrons, *Vieill.*
" solitarius, *Vieill.*
" Noveboracensis, *Gmel.*
* " Gundlachi, *Lemb.*
" olivaceus, *L.*
* Phyllomanes barbatulus, *Cab.*
* " altiloquus, *Vieill.*
* Teretistris Fernandinæ, *Lemb.*
* " Fornsi, *Gundl.*
Bombycilla Carolinensis, *Bris.*
† Todus Portoricensis, *Less.*
* " multicolor, *Gould.*
* Corvus nasicus, *Temm.*
† " minutus, *Gundl.*
* Sturnella hippocrepis, *Wagl.*
* Calcophanes baritus, *L.*
* Scolecophagus atroviolaceus, *Orb.*
* Xanthornus Dominicensis, *L.*
Yphantes Baltimore, *L.*
" Bullockii, *Sw.*
* Agelaius assimilis, *Gundl.*
* " humeralis, *Vig.*
Dolichonyx orizivorus, *L.*
Guiraca Ludoviciana, *L.*
" cærulea, *L.*
Pyranga æstiva, *Geml.*
" rubra, *L.*
† Spindalis Pretrei, *Less.*
Spiza ciris, *L.*
" cyanea, *L.*
Coturniculus passerinus, *Wils.*
Passerculus Savanna, *Wils.*
Emberiza pallida, *Aud.*
* Euethia lepida, *L.*
* " canora, *Gmel.*
* Melopyrrha nigra,
‡ Macrocercus tricolor, *Vieill.*
† Conurus Guyanensis, *L.*
* Chrysotis leucocephalus, *L.*
Picus varius, *L.*
‡ Campephilus principalis, *L.*
* Chloronerpes percussus, *Temm.*
* Centurus superciliaris, *Temm.*
* Colaptes auratus, *L.*
* " chrysocaulosus, *Gundl.*
† " Fernandinæ, *Vig.*
* Saurothera Merlini, *Orb.*
† Coccyzus Americanus, *L.*
" erythrophthalmus, *Wils.*
" seniculus, *Lath.*
* Crotophaga ani, *L.*
* Priotelus temnurus, *Temm.*
* Chlorœnas inornata, *Temm.*
* Patagiœnas leucocephala, *L.*
* " Corensis, *Gmel.*
* Starnœnas cyanocephala, *L.*
* Geotrygon Martinica, *L.*
* " montana, *L.*
* " caniceps, *Gundl.*
* Chamæpelia passerina, *L.*
* Zenaida amabilis, *Bon.*
* Perissura Carolinensis, *L.*
* Ortyx Cubanensis, *Gould.*
* Gallinula galeata, *Pr. Max.*
Porphyrio Martinica, *L.*
* Fulica Americana, *Gmel.*
Ortygometra Carolina, *Bon.*

Ortygometra Jamaicensis, *Steph.*
* Rallus elegans, *Aud.*
* " crepitans, *Lath.*
‡ " minutus, *Gundl.*
" Virginianus, *L.*
" variegatus, *Gmel.*
† Aramus guarauna, *Illig.*
* Parra jacana, *L.*
* Grus Canadensis, *L.*
* " poliophæa, *Wagl.*
Charadrius helveticus, *Gmel.*
" marmoratus, *Wagl.*
* " vociferus, *L.*
* " Wilsonius, *Ord.*
" semipalmatus,
* " melodus, *Ord.*
Hæmatopus palliatus, *Temm.*
Strepsilas interpres, *L.*
Calidris arenaria, *L.*
Tringoides Bartramius, *Wils.*
" macularia, *L.*
Tringa rufescens, *Vieill.*
" pectoralis, *Bon.*
" Schinzii, *Brehm.*
" pusilla, *Wils.*
" himantopus, *Bon.*
Hemipalama semipalmata, *Wils.*
" minor, *Gundl.*
Totanus chloropygius, *Vieill.*
" flavipes, *Lath.*
" vociferus, *Wils.*
Catoptrophorus semipalmatus, *Lath.*
" speculiferus, *Cuv.*
Limosa fedoa, *L.*
Numenius longirostris, *Wils.*
Gallinago Wilsoni, *Temm.*
Limnodromus Noveboracensis, *Gmel.*
Recurvirostra Americana, *L.*
* Himantopus nigricollis, *Vieill.*
† Tantalus loculator, *L.*
* Eudocimus albus, *L.*
‡ Falcinellus Ordii, *Bon.*
† Platalea ajaja, *L.*
* Nycticorax Gardeni, *Jard.*
* " violaceus, *L.*
Botaurus lentiginosus, *Sw.*
* Ardea herodias, *L.*
‡ Herodias occidentalis, *Aud.*
* Herodias Pealii, *Bon.*
† " rufescens, *Bon.*
* " egretta, *Gmel.*
* " candidissima, *Gmel.*
* " Ludoviciana, *Wils.*
* " cærulea, *L.*
Ocniscus virescens, *L.*
" brunnescens, *Gundl.*
‡ Ardetta exilis, *L.*
* Phœnicopterus ruber, *L.*
Anser hyperboreus, *L.*
" Gambeli, *Hartlaub.*
* Dendrocygnus arborea, *L.*
‡ " viduata.
† " sponsa, *Sw.*
† " spinosa.
Mareca Americana, *Lath.*
Dafila acuta, *L.*
Anas boschas, *L.*
Querquedula Carolinensis, *L.*
Pterocyanea discors, *L.*
" cyanoptera, *Vieill.*
Rhynchaspis clypeata, *L.*
Fuligula rufitorques, *Bon.*
" marila, *L.*
Clangula albeola, *L.*
Nyroca valisneria, *Wils.*
Mergus cucullatus, *L.*
* Phalacrocorax Floridanus, *Aud.*
† " Mexicanus, *Brandt.*
* Plotus anhinga, *L.*
† Fregata aquila, *L.*
* Pelecanus fuscus, *L.*
† Sula fusca, *Vieill.*
* Larus atricilla, *L.*
" marinus, *L.*
" argentatus, *Briss.*
† Sylochelidon Cayennensis, *Gmel.*
† Thalasseus acuflavidus, *Cabot.*
† Gelochelidon aranea, *Wils.*
‡ Hydrochelidon Surinam, *Gmel.*
* " fuliginosa, *Gmel.*
* Sternula frenata, *Gould.*
* Anous stolidus, *L.*
* Sylbeocyclus Carolinensis, *Lath.*
* " Dominicus.
‡ Phaëton flavirostris, *Brandt.*

Dr. Brewer also presented a paper by M. F. Germain, of Santiago, entitled, " Notes upon the Mode and Place of Nidification of some of the Birds of Chili," as follows: —

1. *Pontoaëtus melanoleucus*, vulg. *Aguila*, builds a nest sometimes on the top of an old tree at the foot of a steep rock, but more frequently upon the most inaccessible part of the rock itself. It lays two eggs, generally in September and October. It does not defend its nest.

2. *Polyborus tharus*, vulg. *Traro*, builds its nest on the top of large trees in plains and wooded ravines. The time of laying extends from July to November. It lays two or three eggs.

3. *Milvago chimango*, vulg. *Tinque*, conceals its nest among the branches of trees of medium size. It prefers damp places, and lays from two to four eggs. The time of laying is from October to November.

4. *Buteo erythronotus*, vulg. *Aguilucho*, lays two eggs. It places its nest in the cavity of a rock or on the top of a gigantic tree. It builds in October and November, and seems to prefer ravines which border upon the sea.

5. *Craxirex unicinctus*, vulg. *Peuco*, lays two or three eggs. It conceals its nest in the top of bushy trees. The time of the laying extends from September to March.

6. *Falco sparverius*, vulg. *Cernicalo*, lays in October or November four or five eggs, which it conceals in hollow trees. I have never found one of their nests built in the branches.

7. *Glaucidium nanum*, vulg. *Chuncho*, lays two eggs in the hollows of trees. The time of laying extends from September into November.

8. *Strix perlata*, vulg. *Lechuza*, lays sometime during November from three to five eggs in a hollow tree, or in the cavities of the cliffs which border most of the rivers of Chili.

9. *Stenopsis parvulus*, vulg. *Gallina ciega*, lays in November two eggs, which it deposits on the ground, without any trace of a nest; it chooses solitary and waste places covered with scanty vegetation.

10. *Cypselus leucopygius*, vulg. *Golondrina*, lays from September into December three or four eggs, in a nest poorly constructed, consisting almost entirely of a heap of feathers, which

it places sometimes under the tiles of roofings, sometimes in the hollow of a tree.

11. *Synallaxis œgythaloides*, vulg. *Colilarga pingueridita*, lays in October or November from two to four eggs, in a nest badly constructed, composed of straws and feathers, which it places sometimes in the hollow of a tree, sometimes in the thatch which covers the huts of the peasants.

12. *Synallaxis dorso-maculata*, vulg. *Trabajador*, lays in September or October three or four eggs, in a nest skilfully made, which it attaches to the reeds and rushes of the marshes of the province of Santiago.

13. *Synallaxis sordida*, vulg. *Canastero*, lays in September and October two or four eggs, in a nest skilfully constructed, which it places from three to six feet from the ground, in lonely places which are covered with low and thorny shrubbery, sometimes even on the *Cereus quisco*. This nest, a foot in length, is cylindrical, and composed entirely of little thorny branches. The opening is in the side near the top, and forms a passage in the upper part, which conducts to the lower part, which alone is provided with feathers to receive the young.

14. *Cinclodes nigrofumosus*, vulg. *Molinera*, lays in the hollows of the cliffs on the borders of streams. It collects water-plants and builds of them a rude nest, on which it deposits two or three eggs. The time of laying embraces the months of October and November.

15. *Troglodytes platensis*, vulg. *Chercan*, builds a large nest of pieces of wood, straw, thread, wool, and feathers. This nest, badly made and badly fastened, is not durable. It is placed indiscriminately in the holes of trees, or of cliffs, in old walls, and even under the tiles of houses; it lays from September to November from three to six eggs.

16. *Scytalopus fuscus*, vulg. *Churrin*, lays in October or November two eggs, in a nest rather badly made, which it conceals under brushwood in the vegetable detritus, and which it approaches through a gallery or corridor, made in the same materials in which the nest is placed. The solitary and wild habits of this bird make it not only difficult to find its nest, but even to see it or to shoot it.

17. *Cyanotis omnicolor*, vulg. *Sietecolor*. This pretty little

bird suspends its nest from the rushes in the swamps of the province of Santiago, and lays from two to four eggs in the months of September and October.

18. *Pteroptochus albicollis*, vulg. *Tapaculo*, lays in October and November two eggs, in a badly-made nest, which it places in the holes of cliffs, or oftener in the empty galleries of the *Octodon Cumingii*.

19. *Muscisaxicola nigra*, vulg. *Colegial, pellejo del homo*, lays in October and November from three to four eggs, in a pretty little nest, which it builds upon the ground, principally in barren and pebbly places bordering on rivers.

20. *Mimus thenca*, vulg. *Trenca* or *Tenca*, lays in October or November three or four eggs, in a well-built nest, made on the outside of small branches and on the inside of straw and wool, which it places a little above the ground on shrubs.

21. *Agriornis lividus*, vulg. *Sortal mero*, lays in October and November two or four eggs, in a badly-made nest, placed in the holes of cliffs.

22. *Culicivora parvulus*, vulg. *Torito cachudito*, lays from September to November from two to four eggs, in a small nest, which it places in shrubbery, even in nettles, a few feet from the ground.

23. *Tœnioptera pyropa*, vulg. *Diucon papamoscas*, lays in October and November from three to four eggs, in a nest made of pieces of wood, straw, and moss ; this is found sometimes in holes on the edges of cliffs, sometimes on trees at the junction of the branches, even at the height of from six to twelve feet.

24. *Myiobius albiceps*, vulg. *Arriero, Chiflador*, lays from November to January from two to three eggs, in a pretty nest, which it builds in the thick foliage of shrubs.

25. *Leichenops erythropterus*, vulg. *Runrun*, lays from two to three eggs in a nest which it builds in the course of November, and which it places on the ground in marshy and moist places. I ought to rectify here an error in Mr. Gillis's work on Chili, in regard to the female of this species, which is no other than his *L. erythropterus*. I am perfectly sure of this fact.

26. *Turdus fuscater*, vulg. *Sorral*, lays from October to November three or four eggs, in a nest constructed and lined with moss, which it places a little above the ground in shrubs.

27. *Agelaius theleus*, vulg. *Trile*, lays in October three or four

eggs, in a well-made nest, which it often builds among grain, sometimes on the ground, sometimes suspended to the stalks; but generally it places its nest in moist places, among aquatic plants; at other times it is fastened to rushes, or the branches of trees, which hang over the water.

28. *Psarocolius Curæus*, vulg. *Tordo*, lays in November three or four eggs, in a nest made with earth, furnished outside with thorns and inside with moss.

29. *Sturnella militaris*, vulg. *Loica*, lays three or four eggs, in a badly-made nest, composed of weeds, always placed on the ground, and almost buried at the foot of plants.

30. *Clorospiza alaudina*, vulg. *Duiquita*, builds its nest in September or October, and always places it on the ground at the foot of shrubs, in mountainous and arid places. It lays three or four eggs.

31. *Phrygilus diuca*, vulg. *Diuca*, lays from July to January three or four eggs, in a large and well-made nest, which it places near the ground in low bushes.

32. *Zonotrichia matutina*, vulg. *Chincol*, lays from September to November two to four eggs, in a rudely-constructed nest, which it places indifferently on the ground or a little elevated in bushes, and sometimes in the hollows of trees or cavities in cliffs.

33. *Grithagra brevirostris*, vulg. *Chirigue*, lays in October three or four eggs, in a slight nest, which it places in the grain-fields or meadows, either on the ground or a little above it.

34. *Phytotoma rara*, vulg. *Rara*, lays from September to November two or three eggs, in a well-made nest, furnished outside with thorns and inside with moss and grasses. It places the nest near the ground, in the thickest-leaved and most tufted bushes.

35. *Picus lignarius*, vulg. *Carpintero*, hollows its nest in the branches of decayed trees, and lays two or four eggs, on the bare wood, in October or November.

36. *Columbina picui*, vulg. *Tortolita cuyana*, lays in September or October, in hedges, two eggs, in a flat nest, badly made, and composed of small branches.

37. *Peristera auriculata*, *Zenaida aurita*, vulg. *Tortola*, lays two eggs in October, in a flat and simple nest, which it places a little elevated, in the branches of trees in ravines.

38. *Nothura perdicaria*, vulg. *Perdiz*, lays from August to

November six to ten eggs, in the grain-fields and other places covered with grasses and a few shrubs. It does not make a nest, but makes a slight hollow in the earth with its feet.

39. *Vanellus Cayennensis*, vulg. *Gueltregue*, lays from July to November two to four eggs, in marshy places. It makes no nest, but hollows out a kind of cup in the clods of earth which are just above the water, and puts in it a few straws; this constitutes its nest.

40. *Ardea egretta*, vulg. *Garza grande*, unites in communities to lay, sometimes upon rocks at the sea-shore, sometimes on the trees in woody ravines, where it builds large nests with branches and grasses. It lays from four to eight eggs from October to November.

41. *Nycticorax Gardenii*, vulg. *Guayrabo*, unites in companies to nest. They build near together on the reeds, or on the bushes which surround the marshes. Their nests consist of a heap of bent rushes and little sticks of wood. They lay from three to five eggs in October or November.

42. *Himantopus nigricollis*, vulg. *Perrito*, lays in November three or four eggs in the marshes. For this purpose it chooses slight elevations, where it lays together a few dry grasses in the form of a nest. It manifests much courage when one approaches its nest.

43. *Ibis melanopis*, vulg. *Bandurria*, in the month of October builds a rude nest in steep and rugged rocks, in which it deposits from three to five eggs. In the provinces of the south, it chooses for its nest the summits of dead, high, and inaccessible trees; in the north, it retires often for this purpose to the Cordilleras, to the height of seven or eight thousand feet.

44. *Falcinellus guarauna*, vulg. *Cuervo*. These assemble in numerous flocks for nesting, and lay from November to December four to six eggs in a nest of rushes, placed in the midst of reeds.

45. *Gallinago paraguia*, vulg. *Porotera*, from July to September lays two eggs, which it deposits in a rude nest composed of straw and dried grass, in swampy meadows.

46. *Rhynchœa semicollaris*, vulg. *Abecassina*, does not build a nest, but lays in September and October two or three eggs in marshes and inundated fields, depositing them on the mud or wet grass.

47. *Hæmatopus palliatus,* vulg. *Tiratira,* in October and November deposits two or three eggs on the sand near the borders of the sea.

48. *Rallus bicolor* (*cæsius,* Spix ?), vulg. *Siden,* lays in October and November three or four eggs, which it deposits in a badly-made nest, composed of grass, which it conceals among the marshy plants.

49. *Gallinula crassirostris,* vulg. *Sollolla,* builds in October, on the border of small streams, a rude nest, in which it deposits three or four eggs.

50. *Fulica Chilensis,* vulg. *Tagua,* builds in September and October a large nest, composed of broken rushes heaped together, which it places in inundated marshes in the midst of the reeds, and there lays from four to eight eggs.

51. *Podilymbus antarcticus,* vulg. *Picuriò,* builds on small streams a flat, floating nest, composed of wet grass, in which it lays in October and November three or four eggs.

52. *Larus glaucodes,* vulg. *Caguil,* (*Chellé* in Chiloë), assembles in flocks, in the last of November or during December, to lay their eggs. They retire for this purpose to lakes in the vicinity of the sea-shore, or to the rivers in the south of Chili. They build large floating nests, composed of grass and rushes, selecting places covered with rushes. In these nests they deposit two or three eggs.

53. *Larus Dominicanus,* vulg. *Garrota,* chooses for laying the summits of inaccessible rocks on the sea-shore, and deposits toward the last of November and in December two or three eggs, on a rock or upon the grass, with hardly any appearance of a nest.

54. *Sterna aranea,* vulg. *Chibrillo,* (*Chiliuta* in Chiloë), assembles in flocks, in November and December, to lay their eggs, and chooses for this sandy shores, depositing two or three eggs on the ground, without building a nest.

55. *Dafila Bahamensis,* vulg. *Pato jergon grande,* lays from five to eight eggs, from August to October. It chooses for its nest half-dry marshes, the borders of streams, and even grain-fields.

56. *Anas cristata,* vulg. *Pato juarjual,* retires to lay in the Cordilleras, at the height of from six to eight thousand feet. It chooses peat bogs and small swamps in which to build a simple nest, wherein it deposits from four to six eggs.

57. *Anas melanocephala*, vulg. *Pato rinconero ;* 58. *Mareca Chiloensis*, vulg. *Pato real ;* 59. *Querquedula cœruleata*, vulg. *Pato colorado ;* 60. *Q. creccoides*, vulg. *Pato jergon chico ;* 61. *Q. versicolor*, vulg. *Pato capuchino ;* 62. *Rhynchaspis maculatus*, vulg. *Pato cuchara ;* 63. *Fuligula metopias*, vulg. *Pato negro :* all lay in the marshes of the central provinces. They build their nests from September to October, depositing from four to six eggs. The nest is generally filled with down, and composed of rushes.

64. *Micropterus cinereus*, vulg. *Quetru*, retires to lay in the islands of the archipelago of Chiloë; it places its nest in the wildest and most solitary spots, and furnishes it with a great quantity of down; it lays four or five eggs in December or the last of November.

65. *Cygnus nigricollis*, vulg. *Cisne*, lays from four to six eggs in rather a large nest; the laying of the eggs takes place between June and August, and the nest is placed among the reeds of the marshes, lakes, and rivers of the republic.

66. *Graculus Brasilianus*, vulg. *Yeco*, (*Cuervo* in Chiloë), chooses the rocks on the sea-coast, or trees which border certain lakes or pools, to make its nest; the laying takes place in October and November; for this they collect in great numbers, and make large nests of marine or aquatic plants, (which at the end of several days give forth an offensive smell), and deposit therein three or four eggs.

67. *Graculus cristatus*, vulg. *Lilé* (in Chiloë), *Guamay* (in Conception), collects in flocks to lay its eggs, and for this chooses the inaccessible rocks of the archipelago of Chiloë, upon the summits of which, surrounded by water, they place all their nests, near together, constructed of marine and decaying plants; they lay from two to four eggs in December.

68. *Graculus Gainsardii*, vulg. *Sato Lirio*, (*Lilé* in Chiloë,) lays in November. They choose for their nests the crevices of rocks which rise perpendicularly from the sea, at the foot of which the waves dash; they are made of marine and decaying plants. The eggs are three or four.

69. *Graculus Magellanicus*, vulg. *Lilé*, collects in flocks in December, laying from two to four eggs. They choose the perpendicular rocks of the islands of the archipelago of Chiloë, and in the steepest part they build a nest of marine and decaying plants.

Besides these sixty-nine species, the eggs of about fifty others can be procured, inhabitants of the Cordilleras, of the sea-coast, or of some of the intermediate plains. But with all diligence it is impossible to make a complete collection from so many different points in the short space of a season; and it will not answer for this kind of collection, whose principal merit consists in authenticity, to trust to the words of the natives. There exist a great number of birds on the sea-coast and in the Cordilleras, whose eggs probably will be procured another season. As, unfortunately, the month of November is the time chosen by the greater part of the species for hatching, a complete collection should not be expected until after three years of search. Some of the eggs, sent in numbers, present quite a difference in form and color, and often four or five varieties have been selected from more than fifty specimens. The authenticity of all the eggs of this collection, now in the cabinet of the Smithsonian Institution, may be depended on, as they were personally collected by Mr. Germain, up to December, 1859.

The Committee appointed at the last meeting to nominate a candidate for the Curatorship of Conchology reported the name of Mr. Nathan Farrand, of Boston; and he was unanimously elected.

Mr. Roswell Field, of Greenfield, Mass., made a verbal communication on the footmarks of the Connecticut river sandstones.

Several years ago he came to the conclusion that these tracks were not made by birds, and this conclusion has been confirmed by the examination of great numbers of specimens since. Though some of them look like bird tracks, there is much negative evidence that they are not so; his opinion is that they were made by four-footed animals, in most instances reptiles, and perhaps in a few cases marsupial mammals like the kangaroo; the tracks frequently do not correspond to those of birds, and the marks of small anterior feet and a dragging tail are often perfectly distinct. He believes Dr. Hitchcock has fallen into many errors in considering the animals that made these tracks as birds, or even bird-like. Why bones have not been more often discovered he cannot explain; the few specimens found are not those of birds, though hollow, but reptilian (allied, as the President remarked, to those of the pterodactyl).

Dr. Bryant, on again examining the humming-bird called by him *Trochilus Bahamensis*, found that it possesses ten rectrices like the other members of the family.

The two central tail feathers are nearly covered by the upper tail coverts, and are of the same bronze green color; they are much shorter than the rest, though not sufficiently so to be considered abnormal.

The President made some remarks on the anterior and posterior symmetry of the limbs in man and animals, showing that the arms and legs are to a certain extent repetitions of each other.

Prof. Robert E. Rogers, of Philadelphia, was chosen a Corresponding Member.

Drs. Francis P. Sprague and G. H. Nichols; Messrs. Nathaniel Bowditch and George H. Snelling, of Boston; Rev. Joseph H. Allen, of Jamaica Plain; and Mr. Thomas S. Moore, of Cambridge; were chosen Resident Members.

June 20, 1860.

The President in the Chair.

Prof. William B. Rogers made a Report upon the Registering Thermometer of Dr. James Lewis, of Mohawk, N. Y., the consideration of which had been referred to him at a former meeting.

In describing the construction and operation of the instrument, he exhibited an enlarged drawing of the whole apparatus and its several parts, together with specimens of the records as actually made by it, and of the curves of mean temperature derived from them, which had been furnished by the inventor.

The part of the instrument forming the thermometer proper consists of a cylindrical bundle of iron and brass wires (No. 13), about 15 inches in length, so arranged as to be equivalent to about forty-five inches of iron wire antagonized by about an equal length of brass wire. The bundle is composed of five pairs, two of brass and three of iron, arranged alternately around the centre, and a single wire of brass, equivalent in action to a third pair of that metal, placed in the axis of the cylinder.

The upper end of the central wire, moved by the difference of expansion of the two metals, operates upon the short arm of the first of a train of two levers, and through them upon the axle of a pulley. To the grooved circumference of the larger wheel of this pulley is attached a slender silk cord carrying the *registering point* designed to mark the temperature, and which, by the multiplying effect of the mechanism, is moved over a space three hundred and twenty times as great as the differential expansion or contraction of the wires.

The registering point, properly balanced by an attached weight, and guided in its vertical movements by two slender parallel rods, is made to record the temperature on a fillet of paper moved by a train of cylinders whose axes are parallel to the guide wires. The record is impressed by the impulse of a hammer striking upon the back of the registering point at regulated intervals, and thus producing a series of small perforations in the paper, the hammer and the fillet of paper both receiving their motion from a train of clock-work of peculiar construction connected with the apparatus.

The projecting shaft of the pulley carries an index, which, revolving in front of a dial-plate placed over the pulley, enables the observer to note the temperature as compared with the ordinary thermometer, and to adjust the rod-thermometer to the standard whenever necessary. The adjustment is made by turning a screw connected with the lower end of the central brass wire of the thermometer. The latter instrument is on the outside of the case which incloses the dial, registering apparatus, and clock. By a peculiar arrangement of the clock-work, the hammer movements, and therefore the times of registration, may be adjusted to quarter-hour, half-hour, or hour intervals, and may be changed from one to the other at the will of the observer.

As regards the performance of this very ingenious instrument, Prof. Rogers had obtained many interesting facts from Dr. Lewis, illustrating its great sensitiveness as compared with the common mercurial thermometer, and showing the comparative steadiness and accuracy of its registration within the small limits of error due to the friction and thermal disturbances to which it is exposed. The inventor, with laudable disinterestedness, asked for a thorough scrutiny of the practical value of his contrivance. While offering information to others, he was himself a severe critic of its daily workings, and has been led since its first construction to introduce various modifications adapted to reduce resistance, to exclude radiation, and otherwise to improve its fidelity in appreciating and registering the changes of temperature. A somewhat longer experience may be needed to discover all the peculiarities of action incident to the construction of the instrument, and to give it the permanent reliability for minute registration at which the inventor aims.

Looking to the general principle of the instrument, and to the improvements thus far made in it, and relying on the faithful observation, as well as the ingenuity of Dr. Lewis, for giving it all the accuracy and permanent reliability of which it is capable, Prof. Rogers felt it his duty to commend the registering thermometer of Dr. Lewis to the Society, as an instrument worthy the critical examination of men of science, and one which promised to become a valuable help in meteorological observation.

Dr. A. A. Gould presented, in the name of Mr. Charles A. White, a paper entitled "Observations upon the Geology and Paleontology of Burlington, Iowa, and its Vicinity." It will be published in full in the Journal of the Society.

Prof. Rogers remarked on the importance of the facts set forth in the paper of Mr. White, not merely as giving greater precision to our knowledge of the interesting locality to which they relate, and adding many new forms to the catalogue of our paleozoic fossils, but as helping to illustrate geological questions of wide application and interest in the philosophy of the science.

The *gradual passage* from a Devonian to a carboniferous fauna, previously noted in this locality by Prof. Hall, and now so clearly exhibited by Mr. White, belongs to a class of phenomena of which not a few examples have been brought to light in other parts of the geological series, and of which many more will doubtless be discovered in the progress of a critical and philosophical survey of fossiliferous deposits. Prof. Rogers considered such a gradational change, or such a mingling of races in successive formations, as but the natural result of the accumulation of the strata during a long period of comparative repose. He believed that the abrupt transitions so often observed in passing from one geological formation to another were not, as some maintain, an essential feature in the life-history of our earth, but were the memorials of the disturbing and destroying agencies to which its living races had been successively exposed. These hostile influences have at no time been of equal intensity over widely extended areas, but varying from region to region have in some places arrested only in part the stream of living descent, thus substituting for the abrupt transition which marks the successive faunæ of one district, the gentle gradations and intermingling of forms presented by the corresponding deposits of another.

Referring even to the limits of the great paleozoic divisions, so often defined by sharp lines of separation, observation has shown that in some localities the transition is so gradual as to present no greater amount of change in fossil forms than occurs in passing from one subordinate formation to the next. Hence we find that the ablest European geologists are not agreed as to the line of separation between the Silurian and Devonian, or between the latter and the carboniferous deposits of some of their best-known districts, while recent observations in this country and abroad have tended to obliterate the presumed line of demarcation between the carboniferous and overlying Permian strata, wherever the transition beds are most completely developed.

As regards the passage from the Devonian to the Carboniferous series, Prof. Rogers remarked that the observations of Mr. White on the Burlington strata had their counterpart in those of Griffith, Jukes, McCoy, and other Irish geologists, who have been led to include in the lower Carboniferous series of Ireland a thick group of deposits which Murchison and others place in the Devonian. Indeed, according to McCoy's determinations, the carboniferous limestone of Ireland contains among its fossils quite a number of forms identical with those of the Devonian rocks, as well as many that belong also to the Upper Silurian.

These facts and considerations lend support to the view that the changes of fossil faunæ are more gradual in proportion to the degree in which the successive deposits of a given period have been preserved from destruction, and certainly favor the doctrine of a gradational continuity in the succession of living races rather than that of sudden underived creations.

Looking to the question of the equivalency in time of the rocks described in Mr. White's paper with deposits in the eastern and southeastern parts of the Appalachian basin, we are struck with the enormous thickness of the several groups of strata in the latter region, which find a representation, as to period, in the inconsiderable mass of calcareous and other beds, occupying, in this western locality, the interval between rocks of unequivocally Devonian and Carboniferous ages. In this part of the Appalachian area, the interval referred to includes not only the vast thickness of red and variegated strata of the Ponent or Catskill series, but in Pennsylvania and Virginia a great mass of conglomerate, sandstone, and shale, containing in some districts considerable seams of coal, the whole attaining in places an aggregate thickness of more than six thousand feet. This latter, or Vespertine series, maintaining a position always below the shales and limestones charged with *Archimedes* (*Fenestella*) *Pentremites*, and other carboniferous limestone fossils, and forming a lower carboniferous group corresponding to that of Scotland and Nova Scotia, may perhaps claim a place on the same time-level with the portion of the Burlington group in which the carboniferous forms have assumed predominance, or may extend in period as far as the lower Archimedes or Keokuk limestone.

But all such attempts at synchronizing distant deposits must be *limited to a general and vague result.* Even when corresponding fossils would seem to mark a simultaneous origin, we must not forget the large agency of migration, and the long lapse of years which in many cases may have been required for the extension of a living race into distant submarine settlements.

Prof. W. B. Rogers referred to some observations communicated to him by Mr. L. W. Bailey, in relation to an interesting locality of Diatomaceæ, at Oaklands, North Providence. From an examination of the spot, Mr. Bailey has furnished the following brief description: —

"The locality is a pond of several hundred feet in circumference, in a natural basin somewhat enlarged, lying to the eastward of the dwelling of Mr. A. Eaton, on whose estate it is situated, and who was the first, I believe, to notice the deposit. Near the side of the pond are several constant springs running into it, and in the vicinity of these we find a white, soft earth, which, on examination, proves to be entirely composed of the siliceous epiderms of Diatomaceæ.

"It was late in the winter when the deposit was first pointed out to me, and even at that inclement season I found living Diatoms quite abundant in the pond, of the some character, for the most part, as that of the fossil bed. At the present time, (May,) the pond is very rich in specimens of all the forms represented in my drawings, besides many beautiful Desmideæ, Confervæ, and Infusoria of every description.

"As to the extent of the deposit, I have been able to learn but little, owing to the depth of the pond, the abrupt descent of its bank, and the general swampy character of the ground. The layer of Diatoms crops out distinctly at only one point, where it is several feet thick; but from various facts I should infer that the deposit extends over a space much larger than the present area of the pond. The surrounding field of ploughed land is filled, at some distance from the pond, with small white and powdery lumps, probably upturned by the plough, which, under the microscope, are found to be made up entirely of the same forms as the pond deposit.

"This locality seems to me an interesting one on account of the large mass of the deposit and its remarkable exemption from foreign matters, as well as the extraordinary size and distinctness of most of the included forms. I hope from future examinations to be able to present a more complete account of the locality, and of its interesting microscopic remains."

Dr. A. A. Gould presented the following descriptions of new shells collected by the United States North Pacific Exploring Expedition:—

TEREBRATULA TRANSVERSA. T. reniformis, distorta, transversa, tenuis, rufo-flavescens, punctata, costis radiantibus angulatis ornata; valvis flexuosis, convexiusculis lateraliter angulatis; margine cardinali recto; apice vix eminente; foramine magno interrupto; apophysi libero, imprimis exili deinde aculeo divergente munito, denique membranaceo et in laqueo recurvo protracto. Long. 6; diam. transv. 8; lat. 4 poll. Inhabits Hakodadi Bay. W. S.

Like *T. Grayi* as to form, color, and sculpture; the internal supports are much shorter, and the diverging processes and membranous loop are also characteristic.

TEREBRATELLA MINIATA. T. magna, rhomboideo-ovalis, globoso-lenticularis, punctata, striis incrementi solum insculpta, miniata; valvâ ventrali ventricosâ, sulco mediano modico fluctuatâ, costâ acutâ medianâ intus munitâ; margine postico vix angulato; valvâ dorsali tectiformi, anticè subtruncatâ, posticè rostratâ; foramine modico, integro; apophysi primò gracili, dein subitò latè expanso et ad cristam medianam affixo, denique reflexo et laqueam efformante. Diam. long. et transv. 1.5 poll.; alt. $\frac{7}{8}$ poll. Inhabits Hakodadi Bay. W. S.

In size, form, and color much like T. *rubra* or *Zelandica*, but less fan-shaped and entirely destitute of radiating furrows or ribs. The surface is like *T. lenticularis*, but is proportionally shorter and trilobately waved. It is, moreover, generically distinct by the union of its apophyses with the central crest.

RHYNCONELLA LUCIDA. T. subcircularis, tenuissima, lucida, dilutè cornea, valvis subæqualibus, ventricosis, impunctatis, sub lente radiatim striata; foramen integrum, parvum; cardo ut in Rhynconellâ; apophyses? Diameters about $\frac{1}{4}$ inch. Dredged off Japan Coast, 30° 35′ N., 130° 40′ E., in 110 fathoms, sand, by Capt. Stevens, of the "Hancock."

Might be taken for a small *T. vitrea*, but is very thin and delicate, and further distinguished by its destitution of punctures.

Discina stella. T. parva, discoidea, plano-convexa, tenuis, ex apice vix eccentrico levigato demum radiatim striata; valvâ inferiori posticè truncatâ, disco rimato cardiformi; limbo radiato, radiis filiformibus admodum articulatis; margine ciliato. Diam. $\frac{1}{4}$ poll. circiter. Adhering to shells dredged in the China Sea. W. S.

A specimen in Mr. Cuming's collection is much larger. Young specimens are quite destitute of radiating lines.

Trichotropis ellipsoidea. T. parva, tenuis, ovata, albida, liris quadratis (interspatiis clathratis) cincta; anfr. 6 ventricosis; suturâ canaliculatâ; epidermide tenui, liris ciliatis: apertura ovata, anticè acutè rostrata; labro simplici, arcuato; margine columellari tenui, erecto; umbilico parvulo. Axis 10 millim.; diam. 5 millim. Dredged in Hong Kong Bay. W. S.

Has the aspect of *T. inermis*, as figured by Middendorff, but is smaller, much more elongated, and the pillar and canal are quite different.

Trichotropis (Iphinöe) coronata. T. ovato-rhomboidea, turrita, tenuis, cinerea, epidermide fibroso ad carinam in fimbriam cirrosam producto induta; umbilico lato, profundo, acutè marginato; anfr. 6+ citò crescentibus, posticè tabulatis, ad angulum carinatis: apertura ovato-triangularis, labro simplici; columella recta, anticè vix reflexa, acuta, subcanaliculata: operculum ovatum, corneum, apice terminali. Long. 25 millim.; lat. 15 millim. Hab. Arctic Ocean, Straits of Semiavine, 20 fathoms, mud. W. S.

May, perhaps, be *T. ciliata*, Kruger, which I have not seen. A very curious and elegant species.

Ringicula denticulata. T. ovata, acuminata, solida, lactea, striis confertis transversis (exilioribus interdum intervenientibus) insculpta; anfr. 5 ventricosis: apertura angusta; labro admodum incrassato intus denticulato, ferè ad sinum siphonalem interrupto; plicis acutis, transversis; callo modico, haud appresso; dente parietali modico. Axis 5 millim.; diam. 3.5 millim. Inhabits Port Jackson, N. S. W. W. S.

The numerous striæ, denticulate labium, and scantiness of callus about the siphonal notch, mark this species.

Ringicula doliaris. T. majuscula, tenuis, ventricosa, ovata, albida; spira acuminata, anfr. 4 rotundatis, sulcis transversis remotis insculptis, ultimo amplo; suturâ profundâ: apertura magna, labio angusto, haud incrassato, plicis columellæ tenuibus, acutis, plicâ parietali parvâ, tenui; callo siphonali modico. Axis 5 millim.; diam. 3+ millim. Inhabits Hakodadi Bay, 6 fathoms, sandy mud. W. S.

Peculiar from its thin lip and general want of callus.

Ringicula arctata. T. solida, ovata, acuminata, alba; spiræ anfr. 4+ convexis, ultimo striis volventibus (10–12) insculpto; suturâ profundâ: apertura auriculata, labro incrassato, intus tumido; plicis ad columellam conspicuis; dente parietali robusto, usque ad angulum posticum aperturæ protracto; callo labiali lato, sinum siphonalem transeunte. Axis 4; diam. 3 millim. Inhabits Hong Kong Harbor. W. S.

Allied to *R. caron* and *propinqua*, but the sculptured lines are much more crowded.

Buccinum Stimpsoni. T. magna, solidula, elongata, fusiformi-turrita, cinerea vel dilutè ferruginea, epidermide calcareâ caducâ incrustata, lineis tenuibus cincta; anfr. 6 ad 8+ pyramidatis, pentagonalibus, ultimo anticè excavato, costâ cincto ubi undæ terminantur. Apertura dimidiam longitudinis testæ adæquans, angustè lunata; labro simplici; columellâ arcuatâ, callosâ; fauce dilutè castaneâ vel lividâ. Long. 100; diam. 45 mill. Habitat Arikamcheche Island, Behring's Straits. W. S. Dredged in Arctic Ocean. Capt. Rodgers.

A quite remarkable species, allied to *B. undatum*, but at once distinguished by its elongated form, and its pyramidal, pentagonal whorls with concave sides.

Buccinum Rodgersi. T. ovato-lanceolata, solidula, luteo-cinerea crustâ cretaceâ sub epidermide tenuissimâ induta, striis exilissimis cincta; anfr. 8 tumidulis spiram elongatam nunc undulatam nunc æquam efformantibus, ultimo trientes duas long. metiente et in rostram satis productam sensim contracto. Apertura ovata dimidiam long. testæ haud æquans, labro evaso, posticè sinuato; columellâ callo benè indutâ; fauce flavidâ vel lividâ. Long. 55; diam. 25 millim. Inhabits Arikamcheche Island, Behring's Straits. W. S. Common in 20–30 fathoms, muddy gravel, Arctic Ocean, north of Behring's Straits. Capt. Rodgers.

Like *B. undatum* the varieties are very widely contrasted as to the undulation of the surface, and but for the uniformly slender growth and elongated beak might possibly have been brought under that species.

Neptunea (s. g. Sipho) terebralis. T. elongata, ovato-fusiformis, rufo-cornea, externè cretacea longitudinaliter ordinatim striata, costis et fossis subæqualibus (anfr. spiræ ad 8) cincta; anfr. 7+ rotundatis supernè tabulatis, ultimo trientem long. testæ adæquante. Apertura pyriformis, rostro modico, labro arcuato, intus denticulis submarginalibus instructo et strigis rufis costis respondentibus ornato. Axis 60 millim.; diam. 25 millim. Inhabits Arctic Ocean.

In general form, like *N. Icelandica* excepting as to the angularity of the posterior part of the whorls, but clearly distinguished by the exterior ribs and grooves. The lip is broken, but there is a specimen from Spitzbergen, in good condition, in Mr. Cuming's collection, from which I have taken the character of the lip.

Neptunea arata. T. parva, ovato-fusiformis, solidula, rufo-cinerascens, striis profundis incisa et striis incrementi concinnè clathrata; anfr. 5+ ventricosis ad suturam declivibus, undulatis, ultimo subvaricoso; sutura exili. Apertura pyriformis, dimidiam long. testæ adæquans, labro acuto, serrulato, intus denticulato; columellâ subperforatâ, callo rufo indutâ. Axis 23 millim.; diam. 10 millim. Inhabits ——— ?

Neptunea æstuosa. T. ovata, solida, fulvo-cinerea, sulcis angustis remotis cincta, et fluctibus obliquis ad 12 ornata; anfr.

5+ tumidis posticè carinatis et apud fluctus subnodosis, versus suturam declivibus. Apertura lunata, labro acuto intus sulcato; columellâ admodum excavatâ; rostro brevi valdè recurvo. Axis 45; diam. 25 millim. Inhabits Kagosima. W. S.

EUTHRYA LACERTINA. T. ovato-fusiformis, longitudinaliter undulata et strigis rufis ornata, ad peripheriam pallidè zonata; anfr. 6 convexis propè suturam constrictis, et filis confertis cinctis. Apertura dimidiam long. testæ adæquans, lunata, posticè acuta; labro arcuato, crenulato, intus sulcato, sulcis fusco tinctis; columellâ flexuosâ; rostro brevi, lato. Axis 25 millim.; diam. 10 millim. Inhabits Simon's Bay, Cape of Good Hope. W. S.

Resembles *Pisania D'Orbignyi* or *P. maculosa;* but the furrows within the lip, want of posterior callus, and shortness of canal, as well as general form, distinguish it.

PISANIA MOLLIS. T. elongata, ovato-rhomboidea, subtenuis, cinerea, epidermide duracino induta; anfr. 6 convexis vix plicatis, posticis spiraliter filosis, filis anticè liras duas efformantibus; anfr. ultimo $\frac{3}{4}$ long. testæ, liris anticè ad 8 et liris numerosis minoribus posticis cincto; suturâ profundâ. Apertura angusta, ovata; labro acuto denticulato; fauce sulcatâ, lividâ; columellâ vix callosâ; rostro satis elongato. Axis. 22 millim.; diam. 12 millim. Inhabits Simoda. W. S.

FUSUS MODESTUS. T. parva, elongata, ovato-lanceolata, rudis, fusco-cinerea, longitud. undulata (undis ad 15) et liris conspicuis ad 5, minoribus intervenientibus cincta; striis incrementi lamellosis; anfr. 7 tumidulis. Apertura ovata dimidiam longit. testæ haud æquans; labro simplici intus subsulcato; fauce castaneâ. Axis 25 millim.; diam. 6 millim. Inhabits Hakodadi, in 10 fathoms, shelly sand. W. S.

PERISTERNIA FENESTRATA. T. parva, fusiformis, flavido-rubescens, liris exilibus confertis cincta, interspatiis concinnè clathratis, longitud. vix plicata, liris binis suturæ propinquis majoribus alveolas efformantibus; anfr. 6 convexis, ultimo anticè constricto; suturâ profundâ. Apertura ovata dimidiam longitud. testæ adæquans; labro concinnè crenato, intus sulcato; columellâ callo erecto anticè indutâ; rostro ferè clauso. Axis 13 millim.; diam. 6 millim. Inhabits Simon's Bay, Cape of Good Hope. W. S.

Only a single specimen was found; quite remarkable for the contraction about the beak, and the embrasure-like pits near the suture.

Peristernia inculta. T. parva, solida, fusiformis, rufa; anfr. 8 convexis ad suturam declivibus liris inæqualibus cinctis et fluctibus ad 7 ornatis, ultimo vix dimidiam longitudinis æquante, costâ basali inconspicuâ in dentem ad labrum productâ; rostro gracili contorto. Apertura rotundato-ovata; labro crenulato intus denticulato; columellâ leviter plicatâ; fauce luteâ. Axis 25 millim.; diam. 12 millim. Inhabits ——— ?

In the young stage, there is a long, delicate spine on the outer lip, as in *Leucozonia*, which becomes obsolete with age.

Sistrum parvulum. T. parva, ovato-rhomboidea, fusco-cinerea, longitudinaliter ad 9-plicata et costis 5 nodulosis cincta; anfr. 5 angulatis, supernis erosis, costâ unicâ nodulosâ cinctis. Apertura angusta, lunata, dimidiam longitudinis testæ adæquans; fauce fuscescente; labro fusco maculato intus albo-dentato; columellâ politâ. Long. 12; diam. 7 millim. Habitat Simon's Bay. W. S.

The color and nodulations are much as in *S. tuberculatum*, but the form is more rhombic, and the size much less.

Nassaria curta. T. parva, elongata, ovato-rhomboidea, solidula, straminea ante suturam pallidior et fulvo maculata; anfr. 6+ ventricosis filis ad 8 volventibus et plicis ad 15 longitud. ornatis. Apertura angusta ovalis; labro incrassato intus denticulato; laminâ columellari erectâ; rostro modico, recto. Axis 10; diam. 6 millim. Inhabits Port Jackson. W. S.

It is smaller than any species in the Cuming Collection, and has a short beak. It is like *N. carduus*, Rv., but has more delicate waves.

Murex (Ocinebra) improbus. T. parva, rudis, rhomboideo-fusiformis, lineis incrementi muriculata, cinereo-fulvida, strigis et fasciis obscuris rufescentibus et cingulo albido ornata; anfr. 6+

medio angulatis posticè excavatis vel declivibus, anticè plicas 7 ad 8 tuberculosas gerentibus, filis inæqualibus numerosis ubique cinctis quorum duobus anterioribus majoribus. Apertura dimidiam longitud. testæ adæquans, angusta, ovato-rhomboidea; labro denticulato intus incrassato et sulcato; fauce citrinâ vel lividâ; columellâ politâ; rostro subperforato. Axis 25; diam. 12 millim. Inhabits China Seas, in sand, 25 fathoms. W. S.

Much like *O. buxeus*, but shorter.

Trophon incomptus. T. ovato-trigona, solida, rudis, cinerascens; spira turrita, anfr. 6 angulatis posticè tabulatis, ultimo ventricoso, trigono, liris inæqualibus (tribus majoribus) cinctis, longitudinaliter undulis inordinatis et laminis incrementi instructis. Apertura ovata posticè rotundata; labro simplici papillis paucis intus instructo; canali brevi recurvo ferè clauso; fauce castaneâ. Axis 30 millim.; diam. 16 millim. Inhabits Hakodadi. W. S.

Closely allied to *T. crassus*, which has the suture channelled and the lip dentate; young specimens have the laminæ quite prominent, with small spines at the angles.

Trophon suppositus. T. pyriformis, turrita, tenuis, sordidè alba, laminis erectis remotis clathrata, interspatiis concavis lævibus; anfr. 6 convexis posticè tabulatis; ultimo bulboso anticè in rostrum tenuem recurvum protracto. Apertura ovata $\frac{3}{5}$ longit. testæ adæquans; columellâ porcellanâ. Axis 30 millim.; diam. 15 millim.; aperturæ long. 20 millim. Inhabits ——— ?

Triton (Monoplex) fossatum. T. solida, subglobosa, flavida; spira brevis, anfr. sex fossâ latâ profundâ sejunctis et costulis duabus cinctis (costulis striâ medianâ impressis) et undulas longitudinales noduliferas remotas gerentibus: apertura angusta, perobliqua posticè rotundata; labro varicoso, denticulato intus sulcato; labio erecto sulcato, sulco postico majori; rostro brevi. Axis 35; diam. 30; apert. 20 millim. Habitat, Hong Kong. W. S.

Like *T. canaliferus* this would be at once noticed for the deep sutural channel; but it is altogether of a short, ventricose form, with a very short canal. It approaches, in form and sculpture, to *T. doliarius*, which lacks the canal and has a longer beak.

TEREBRA BIPARTITA. T. parva, subulata, gracilis, tenuis, nitida, ubique striis exilibus confertis cincta, et plicis modicis flexuosis ad 15 munita; anfr. 14 convexiusculis posticè leviter instrictis, posticè flavidis anticè castaneis, ultimo filo flavo cincto: apertura lunata; rostro curto, lato. Axis 15; diam. 4+ millim. Inhabits Hakodadi Bay, 20 fathoms. W. S.

TEREBRA ARGUTA. T. parva, gracilis, turrita, ad apicem lanceolata, ex stramineo rubescens; anfr. 12+ convexis, plicis ad 20 eminentibus acutis, ad interspatia lineis volventibus impressis et posticè striâ profundâ incisis; ultimo anticè cancellato ad rostrum constricto: apertura perangusta, flexuosa; columellâ violaceâ. Axis 25; diam. 5 millim. Inhabits Porto Praya. W. S.

Closely allied to *T. violascens*, Hinds, from New Guinea.

TEREBRA PROLIXA. T. modica, subulata, subtenuis, nitida; anfr. 16 conicis, plicis ad 20 acutis parum elevatis ornatis, posticè striâ volvente incisis; colore dilutè fulvo vittâ rufâ demum evanescente et vittâ pallidâ angulo postico aperturæ exeunte ornato: apertura ovata; columellâ contortâ rufâ. Axis 33; diam. 8 millim. Off China Coast, in 25 fathoms, sandy. W. S.

A distinctly fluted species. *T. amœna* is smaller, shorter, and differently colored.

NASSA SUFFLATA. T. ovato-conica, ventricosa, subtenuis, cinerascens, fusco prope suturam tessellata etiam hic illic maculata, striis volventibus paucis anticè et striis binis posticè insculpta: spira acuta, turrita; anfr. 7+ posticis plicatis, ultimo amplo: apertura lata; labro acuto, serriculato; columellâ vix callosâ. Long. 22; diam. 12 millim. Inhabits Hong Kong Harbor. Kagosima. W. S.

Allied to *N. dispar* and *N. mutabilis*.

NASSA BEATA. T. parva, ovato-conica, solida, polita, grisea fulvido vittata, costis acutis ad 15 striâ subsuturali incisis ornata, interspatiis concavis, anfractu ultimo ad dorsum simplici anticè striis 3–4 cincto: apertura parva angusta; labro incrassato intus profundè sulcato; columellâ callosâ, plicato-granulosâ. Axis 10; diam. 6 millim. Inhabits Loo Choo, in 18 fathoms, sandy. W. S.

Very near to *N. optata*, which has a beaded rather than a fluted surface; and the lip and pillar of the aperture are unarmed.

Nassa reposta. T. solida, ovato-conica, rudis, cinerea, plicis inconspicuis 12–14 demum carentibus, et filis remotis (supernè 4) ornata; anfr. 7 convexis posticè sub-angulatis: apertura ampla rotundato-ovata; labro incrassato expanso intus denticulato; columellâ valdè arcuatâ luteâ, vitreâ; fauce fusco-rufâ posticè luteo-fasciatâ. Axis 12; diam. 7 millim. Inhabits Sydney, N. S. W.?

Nassa mustelina. T. parva, elongata, ovato-conica, polita, livida maculis pallidis fusco marginatis variegata, ad anfractum ultimum posticè et anticè vittis pallidis (marginibus articulatis) et lineis binis medianis usque ad labrum acutum pallidum prolongatis cincta; anfr. 8 convexis elevatis: apertura ovata; labro acuto pallido intus polito; rostro pallido; columellâ arcuatâ porcellanâ; fauce lividâ vittis binis pallidis ornatâ. Axis 12; diam. 8 millim. Inhabits Ousima, off the coast, in 2 fathoms, coarse clean sand. W. S.

Allied to *N. zonalis*, but is much larger.

Nassa quantula. T. parva, subtenuis, ovato-globosa, rufo-albida; anfr. 6 convexiusculis, plicis ad 12 et filis confertis volventibus quorum uno postmediano rufo ornatis: apertura ampla rotundato-ovata; labro extus incrassato. Axis 7; diam. 3 millim. Inhabits St. Simon's Bay. W. S.

Nassa optata. T. subtenuis, ovato-conica, acuta, polita, albida demum ferrugineo variegata; anfr. 7 convexiusculis ad 12-plicatis, plicis ad anfr. ultimum tandem carentibus, striis volventibus 5 quorum præsuturali profundiore gemmulas efformante secantibus; suturâ profundâ: apertura latè ovalis; labro intus lævi, extus incrassato rufo variegato; columellâ admodum callosâ. Axis 10; diam. 6 millim. Inhabits Sydney Harbor. W. S.

Very closely resembles the figure of *N. Gayi* of the Conch. Iconica, which, however, is believed to represent a larger and more ventricose shell than that of Kiener.

Nassa dermestina. T. parva, elongato-ovata, posticè acuta, cinerea; anfr. 7 rotundatis 15–16 plicatis et filis ordinatim cinctis ; suturâ impressâ : apertura parva, rotundata ; labro incrassato intus denticulis et sulcis instructo ; columellâ excavatâ leviter plicatâ. Axis 8 ; diam. 4 millim. Inhabits Kikaia. W. S.

NASSA PLEBECULA. T. parva, solida, elongata, ovato-conica, albida ; anfr. 8 suturâ profundâ sejunctis, plicis ad 16 ornatis plerumque ad anfr. ultimum carentibus, et filis nitidis rufescentibus ad 5 cinctis quorum uno majore : apertura parva, subrotunda ; labro albo intus denticulato et sulcato, extus latè incrassato, fusco maculato ; rostro abbreviato. Axis 15 ; diam. 7 millim. Inhabits Ousima. W. S.

More slender than *N. ambigua* and *incrassata*, but closely allied.

NASSA PEDICULINA. T. parvula, solida, ovato-conica, rudis, straminea, plicis ad 12 elevatis et filis rufescentibus 5 ad plicas dilatatis ornatis ; anfr. 7 convexis, apicalibus simplicibus, ultimo anticè coarctato ; suturâ profundâ : apertura subcircularis ; labro obtuso, extus incrassato ; columellâ callo erecto instructâ ; sinu siphonali profundo. Axis 6 ; diam. 4 millim. Inhabits Hong Kong Harbor. W. S.

Most noticeable for its large folds, unfinished aspect, and constriction about the beak.

NASSA SPURCA. T. parva, acuta, ovato-conica, cinerascens vel rufescens lineâ spirali flavidâ cincta, plicis numerosis et filis supercurrentibus ubique cancellata ; anfr. 7 ventricosis : apertura parva rotundata ; labro extus incrassato, intus sulcato ; columellâ arcuatâ, callo fuscescente sparsim granulato indutâ ; fauce fusco vittatâ. Axis 10 ; diam. 6 millim. Inhabits St. Simon's Bay, in 12 fathoms, sandy. W. S.

The fine rasp-like surface and dusky aspect, with the single pale belt, distinguish it ; somewhat like a small *N. trivittata*. This and the preceding belong to the subgen. Tritia, Adams.

MITRA JACULANDA. T. parva, symmetrica, fusiformis, cinereo-rubescens fusco dilutè nubeculata, sulcis longitudinalibus ferè continuis et lineis volventibus levioribus (8) anticis sensim remotioribus clathrata ; anfr. 7 rotundatis, ultimo $\frac{2}{3}$ longitud. testæ adæquante ; suturâ exili : apertura angusta ; labro intus denticulato; columellâ 4-plicatâ. Axis 8; diam. 2.5 millim. Inhabits China Seas. W. S.

Allied to *M. recurva*, Rv., but the sculpture is much more delicate.

Mitra secalina. T. minuta, fusiformis, obtusa, impolita, fulva; anfr. 6, apicalibus secundis, lævibus, ceteris striis exilibus longitudinalibus et transversis quadrulas efformantibus ubique ornatis; suturâ tabulatâ: apertura angusta, posticè quadrata; labro acuto, exiguè crenulato, intus denticulato; columellâ 3-plicatâ. Axis 6; diam. 3 millim. Inhabits Ousima. W. S.

Mitra russa. T. parva, elongato-ovata, castanea vel aurantiaca, nitida, plicis ad 14 ad anfractum ultimum solum expositis, et striis exilibus ad interspatia ornata; anfr. 6 admodum convexis, apice mamillato, ultimo anticè instricto, et lineis volventibus cincto: apertura angustè lunata prorsum dilatans; labro acuto; columellâ 4-plicatâ. Axis 6; diam. 3 millim. Inhabits China Seas. W. S.

Columbella balteata. T. minuta, rhomboidea, elongata, nitida, straminea vittâ fulvâ cincta; anfr. 7 tribus posticis simplicibus, ceteris lyratis et lineâ subsuturali impressis, interspatiis transversim striatis: apertura angustè lunata; labro simplici. Axis 4; lat. 2 millim. Inhabits China Seas.

The cutting of the folds by the subsutural line forms a circle of beads.

This and the following eight species belong to the subgen. Anachis H. & A. Adams.

Columbella (Anachis) nebulosa. T. parva, elongato-ovata, turrita, nitida dilutè flavida saturatiori variegata; anfr. 8 tabulatis convexiusculis lineâ suturali et undulis ad 20 ornatis, ultimo dimidiam longitud. testæ superante, posticè solum undulato, striis volventibus retrorsum decrescentibus insculpto: apertura trientem longitudinis testæ adæquans, lunata. Axis 6; lat. 25 millim. Inhabits China Seas. W. S.

Columbella (Anachis) dorsuosa. T. parva, elongata, ovato-fusiformis, nitida, cerina, vittâ rufâ præsuturali, alterâ rostrum circumambiente variegata, plicis 7 et striis tenuibus transversis ornata; anfr. 8 convexiusculis posticè abruptis: apertura lunata antrorsum angustata; labro acuto. Axis 7; lat. 3 millim. Inhabits Hong Kong. W. S.

Columbella (Anachis) minuta. T. minuta, ovata, turrita, straminea, plicis acutis (12) apud strias rostrum cingentes repentè terminantibus insculpta; anfr. 6 benè discretis: apertura trientem longitudinis testæ penè adæquans, satis lata; labro intus modicè gibboso. Axis 2.5; diam. 1 millim. Inhabits China Seas. W. S.

Allied to *C. parva*, Sowb., which is less slender, and has a brown sutural band.

Columbella (Anachis) zonata. T. minuta, fusiformis, nitida, cerina, vittâ subsuturali castaneâ et alterâ basali latiori cincta, plicis flexuosis 10–12 ornata; anfr. 6 posticè instrictis, ultimo ad rostrum elongatum subitò contracto: apertura angusta; columellâ valdè arcuatâ; labro acuto, simplici. Axis 3; diam. 2 millim. Inhabits Kagosima. W. S.

Columbella (Anachis) fulminea. T. parvula, ovato-lanceolata, nitida, castanea lineis angulatis flavidis variè dispositis, et plicis flexuosis demum disparentibus ornata; anfr. 6 convexis ultimo anticè striis cincto: apertura angusta, dimidiam longitudinis testæ vix adæquans, posticè rotundata; labro simplici posticè leviter incrassato, intus lævi; fauce purpurascente. Axis 7; diam. 3 millim. Inhabits St. Simon's Bay. W. S.

The folds are unusually distinct and prominent.

Columbella (Anachis) atrata. T. minuta, crassa, ovato-lanceolata, anthracina, anticè striis cincta; plicis acutis ad 12 anticè obsolescentibus; anfr. 6 tumidis, modicè tabulatis: apertura angusta posticè acuta; labro simplici posticè sinuoso, intus vix denticulato; fauce atratâ. Axis 5; diam. 2 millim. Inhabits Hong Kong Harbor. W. S.

Columbella (Anachis) minuscula. T. minuta, crassa, elongata, acuminata, fusca; anfr. 7 convexiusculis vix discretis, plicis tenuibus rectis interdum anticè obsoletis clathrata: apertura perangusta, dimidiam longitud. testæ adæquans, posticè acuta; labro arcuato, acuto, simplici, intus granulato; columellâ arcuatâ, callo modico indutâ. Axis 4; diam. 1.5 millim. Inhabits Ousima. W. S.

Though so small, its characters are well marked. A variety is thinner, horn-colored, with two dark revolving threads.

Columbella alternata. T. minuta, elongato-ovata, nitida, straminea maculis elongatis rufis interruptè vittata, ad anfractum ultimum duplicatis; anfr. 5, plicis ad 12 eminentibus obtusis et striis anticalibus volventibus ornatis: apertura curta, angusta; labro incrassato intus crenato. Axis 3; diam. 1.5 millim. Inhabits Hong Kong. W. S.

Sufficiently designated by its stripes of elongated spots arranged on alternate folds.

Columbella virginea. T. minuta, rhomboideo-fusiformis, lactea, plicis (14) et anticè striis paucis munita; anfr. 6 tabulatis et lineâ subsuturali insculptis, ultimo $\frac{2}{3}$ longitud. testæ adæquante antrorsum angustato et admodum recurvo: apertura perangusta, flexuosa; labro edentato; columellæ callo erecto. Axis 4; diam. 1 millim. Inhabits China Seas. W. S.

This small species has the principal characters of the genus *Pyrene*, Bolten.

Columbella bicincta. T. parva, ovata, turrita, tenuis, levis, cinerascens fulvo bicincta; anfr. 8 convexiusculis; suturâ impressâ: apertura lunata; labro arcuato, acuto intus denticulato; columellâ violaceâ, callo tenui, anticè tuberculato. Axis 10; diam. 4+ millim. Inhabits Hong Kong Harbor, 10 fathoms, shelly sand. W. S.

This species and the three succeeding belong to the genus *Amycla*, H. & A. Adams, more especially to the subgenus *Astyris*.

Columbella lineolata. T. parva, ovato-lanceolata, crassa, polita, straminea filis 4 fulvis cincta (ad anfr. ult. 8); anfr. 8 convexis, apicalibus plicatulis, ultimo $\frac{2}{3}$ longitud. testæ adæquante anticè striis cincto: apertura lunata; labro tenui posticè sinuato, intus denticulato; callo columellari copioso; canali curto, lato. Axis 10; diam. 4 millim. Inhabits Hong Kong.

Very closely resembles *C. lactea*, Sowb.

COLUMBELLA DECOLOR. T. parva, ovato-lanceolata, polita, straminea ferrugineo interdum maculata; anfr. 6+ convexis, apicalibus concinnè plicatis, ultimo anticè striato: apertura satis ampla; labro tenui anticè subitò incurvato intus denticulato; columella concava denticulo acuto posticè munitâ; canali curto, angusto. Axis 9; diam. 4 millim. Inhabits Loo Choo. W. S.

COLUMBELLA ARANEOSA. T. parva, ovato-lanceolata, levigata, fulva albido exiliter reticulata et hic illic maculata; anfr. 8 convexiusculis subtabulatis, apicalibus inornatis, ultimo subangulato anticè striato: apertura angusta, posticè rotundata; labro simplici, arcuato, violaceo tincto, intus denticulato; callo columellari copioso, everso, absque denticulo. Axis 10; diam. 4 millim. Inhabits Kagosima Bay and China Coast. W. S.

Generally resembles *C. austrina*, Gask., except in color.

COLUMBELLA (Strombina) PUNGENS. T. parva, lanceolata, polita, ex stramineo fulvescens antrorsum pallescens, plicis numerosis ornata; anfr. 10 conicis, ultimo gibboso subitò constricto ibi spiraliter striato; suturâ impressâ: apertura angusta; labro posticè sinuato, incrassato, antrorsum attenuato; columellæ callo in medio extruso, posticè sinuato; rostro longo, recurvo. Axis 10; diam. 4 millim. Inhabits Port Lloyd, Bonin Islands, common. W. S.

A miniature representation of *C. angularis*, Sowb.

DRILLIA VALLATA. T. parva, lanceolata, lurida; anfr. 10 posticè abruptis, quisque carinam marginalem et fila (1–2) intercurrentia gerens; interspatiis concinnè clathratis; anfr. ultimo subventricoso, filis ad 10 cincto, additis duobus minoribus in sinu terminantibus: apertura $\frac{1}{3}$ totius longitudinis, angusta; labro exstante, sinu lato, profundo; columellâ lævi; rostro brevi, lato. Axis 9; diam. 3 millim. Inhabits vicinity of Hong Kong, in 10 fathoms, shelly mud. W. S.

Allied to *D. violacea*.

DRILLIA RECIPROCA. T. parva, lanceolata, flavescens retrorsum lutescens et obscurè stringata; anfr. 10 convexiusculis, 4–5 carinatis (ult. anfr. 10–12) carinâ medianâ eminentiore, interspatiis clathratis, clathris intervalli postici alteris contrariè obliquis: apertura $\frac{1}{4}$ totius longitudinis; labro valdè producto; sinu lato, profundo; rostro brevi, lato, contorto. Axis 12; diam. 4 millim. Inhabits Ousima. W. S.

Much like the preceding; but the color and relative size of carinæ are different.

Drillia eborea. T. parva, solida, lanceolata, ex eburneo lutescens, striis exilissimis transversis ubique insculpta; anfr. 8+ supernis plicatulis, ultimo $\frac{1}{2}$ totius longit. testæ: apertura lunata; labro simplici, crasso, anticè angulato; sinu crescentico; columellâ callo erecto munitâ; rostro brevi, reflexo; canali angusto ferè clauso.

Shell small, solid, lanceolate, yellowish white, everywhere densely and faintly grooved by transverse lines, most so near the sutures, apicial whorls longitudinally folded; whorls 8+, the last quite half the length of the shell: aperture narrow, lunate, placed somewhat laterally; lip thick, simple, with a slight sinus near its posterior junction; pillar with a thick, erect callus, quite thick posteriorly; rostrum reflexed. Axis 14 millim.; diam. 4 millim. Inhabits Kikaia Island. W. S.

This is a singular species, in structure much like *Claratula felina*, Hinds, but in its aperture and canal approaching to Klein's section *Epidromus* of the genus *Triton*.

Bela turgida. T. parva, crassa, ovata, lactea, epidermide corneo fugaceo induta, sulcis numerosis (28) longitudinaliter arata, interspatiis duplo latioribus et striis confertis transversis insculptis; anfr. 6 curtis, ventricosis; suturâ profundâ: apertura ovata dimidiam totius longitudinis brevior; labro simplici arcuato; columellâ planulatâ, porcellanâ; rostro angusto, curto. Axis 10; diam. 5 millim. Inhabits Kamtschatka. W. S.

Clathurella peregrina. T. ovato-fusiformis, solida, obscurè fulva, plicis obtusis ad 18, filis transversis (ubi plicas decussantibus dilatatis) ornata; anfr. 6+ ventricosis: apertura $\frac{2}{5}$ totius longitudinis lunata, posticè rotundata; labro acuto intus lamellato; canali brevi, angusto abruptè incepto. Axis 12; diam. 5 millim. Inhabits Sydney Harbor.

Closely allied to *C. assimilis*, but less colored, and the striæ less crowded.

CLATHURELLA ASPERSA. T. parva, lanceolata, gracilis, cinerea ferrugineo-maculata, plicis 15–18 flexuosis filis ad 6 transeuntibus clathrata; anfr. 8 perobliquis, convexis posticè paullum constrictis, ultimo $\frac{1}{2}$ totius longitudinis antrorsum acuminato, plicis et filis omnino ornato: apertura lanceolata; labro incrassato, inflecto, intus lævi; sinu lato, profundo; rostro elongato. Axis 14; diam. 4 millim. Off Hong Kong, in 15 fathoms, shelly sand. W. S.

C. Guildingii, Rv. may be the same described from a small specimen.

CLATHURELLA FILOSA. T. ovata, turrita, tenuis, cinerea lineis rufis cincta, plicis flexuosis ad 16 suturam posticè haud attigentibus, et filis transversis 6 ad plicas dilatatis ornata; anfr. 10 ventricosis, tabulatis, ultimo anticè constricto: apertura latè lunata; labro admodum arcuato; sinu juxta suturam, haud profundo; columellâ nudâ. Axis 20; diam. 10 millim. Inhabits Ousima. W. S.

CLATHURELLA RUBICUNDA. T. minuta, crassa, ovato-turrita, dilutè rosacea filis pallidioribus lineâ saturatiori divisis et vittâ subsuturali pallidiori ornata; anfr. 6+ ventricosis citò crescentibus, undulis 10 et filis transversis (ad anfr. penult. 6) clathratis: apertura curta, angusta; labro tumido intus denticulato; sinu angusto, profundo; columellâ flexuosâ; canali brevi. Axis 5; diam. 2 millim. Inhabits Loo Choo. W. S.

CLATHURELLA LACUNOSA. T. minuta, crassa, ovata, testacea, clathris et filis transversis eminentioribus cancellata, cancellis quadratis profundis; spira obtusa, anfr. 6 angulatis posticè excavatis: apertura dimidiam totius longitudinis, angustè lunata; labro incrassato intus lævi; sinu minimè profundo; columellâ flexuosâ. Axis 5; diam. 2.5 millim. Inhabits Hong Kong Harbor, in 10 fathoms, shelly bottom. W. S.

CLATHURELLA AMPLEXA. T. parva, fusiformis, albida fusco (ad anfractum ult.) fasciata, plicis acutis flexuosis ad 10 et striis numerosis confertis (quorum duæ juxtà suturam majoribus) insculpta; anfr. 10 convexiusculis, declivibus, ultimo rhomboideo; suturâ profundâ, crenulatâ: apertura latè lunata; labro tenui; sinu lato, minimè profundo. Axis 9; diam. 3 millim. Inhabits Simon's Bay, in 12 fathoms, sandy bottom. W. S.

Possibly *C. lirata*, which it certainly resembles.

Daphnella deluta. T. parva, tenuis, fusiformis, flavescens maculis ferrugineis zonata, striis elevatis exiguè reticulata, transversis aliquid majoribus; anfr. 7+ convexiusculis elongatis: apertura longa angusta posticè acuta; labro inflecto intus denticulato; sinu valdè profundo; canali brevi, lato; columellâ protractâ in medio tumidâ. Axis 20; diam. 5 millim. Inhabits China Seas. W. S.

Cythara lota. T. parva, ovato-rhomboidea, crassa, alba, plicis acutis ad 12 lyrata et striis profundis (præsuturali aliis majori) cincta; anfr. 4 spiram abbreviatam efformantibus, ultimo antrorsum declivi: apertura angusta, dimidiam totius longitudinis excedens; labro crasso, inflecto, intus dentato; sinu profundo; columellâ sulcis obliquis ad 7 insculptâ. Axis 5; diam. 3 millim. Inhabits China Seas. W. S.

Clavatula pungens. T. parva, fusiformis, cinerea, plicis acutis ad 20 anticè evanescentibus et liris 10–12 (quarum postsuturali majori) plicas undulatim supereuntibus ornata; anfr. 7+ rotundatis, ultimo in rostrum gracilem desinente: apertura parva, pyriformis $\frac{1}{3}$ totius longitudinis testæ; labri sinu angusto, minimè profundo. Axis 9; diam. 3 millim. Inhabits Hong Kong Harbor, in 10 fathoms, shelly sand. W. S.

This shell has the aspect of *Clavatula*, and is very like to *C. debilis*, Hinds; but as the operculum principally characterizes that genus, the generic place must be uncertain.

Mangelia pura. T. parva, subgibbosa, fusiformis, lactea filis exilissimis confertis versus apicem subgranulatis cincta; anfr. 6+ convexiusculis, ultimo maximo rhomboideo, elongato; suturâ lineari: apertura angusta, ovalis; sinu profundo ferè clauso; labro simplici quadrato; canali recto; rostro sine constrictione. Axis 7; diam. 2 millim. Inhabits Hong Kong Harbor. W. S.

This might perhaps come under the genus Cythara.

Mangelia intaminata. T. parva, solida, fusiformis, corallina, plicis tenuibus acutis ad 12 lyrata, et filis ad 5 quorum mediani crassiori cincta; anfr. 6+ convexiusculis, ultimo rhomboideo, $\frac{1}{2}$ totius testæ superante, anticè constricto, filis 10 (quorum uno post constrictionem majori) cincto: apertura angusta; labro incrassato, crenulato, anticè excurvato; sinu parvo. Axis 7; diam. 3 millim. Inhabits China Seas. W. S.

MANGELIA ALBICINCTA. T. minuta, elongata, ovato-turrita, dilutè rosacea, ad 11-undulata et filis ubique cincta (4 ad anfr. ultimum quorum tertio albo); anfr. 7 rotundatis, apicalibus inornatis: apertura angusta, sigmoidea; labro varicoso intus 4-denticulato; sinu angusto, minimè profundo; rostro brevi. Axis 4; diam. 2 millim. Inhabits Loo Choo Seas. W. S.

MANGELIA GLAREOSA. T. minuta, rhomboidea, turrita, crassa, calcarea, plicis elevatis ad 12 et liris transversis ordinatis quicquid minoribus ornata, inde granulata; anfr. 5+ tabulatis: apertura angusta, posticè acuminata, $\frac{1}{2}$ totius longitudinis vix brevior; labro crasso, crenulato; sinu minimè profundo. Axis 5; diam. 2 millim. Inhabits Hong Kong Harbor, in 10 fathoms, shelly bottom. W. S.

MANGELIA LUTEA. T. minuta, acicularis, aurantiaca, plicis 8 conspicuis posticè suturam haud attigentibus, et striis minimè impressis ad interspatia ornata; anfr. 7 planulatis posticè tabulatis, apicalibus inornatis, ultimo rhomboideo $\frac{1}{3}$ totius longitudinis adæquante: apertura angustè ovalis; labro simplici, incrassato, quadrato; sinu lato, brevissimo. Axis 5; diam. 2— millim. Inhabits Loo Choo Seas. W. S.

MANGELIA DEMPSTA. T. minuta, brevis, rhomboideo-fusiformis, lactea, plicis conspicuis ad 8, et filis volventibus crassis ornata; anfr. 6 castellatis posticè angulatis, ultimo $\frac{1}{2}$ totius longitudinis æquante: apertura linearis; labro acuto posticè incrassato; sinu brevi, lato. Axis 3; diam. 1 millim. Inhabits China Seas. W. S.

Remarkable for its elongated rhomboidal form and coarse sculpture.

The Corresponding Secretary read the following list of letters recently received, viz.: —

From the K. K. Akademie der Wissenschaften, Wien, February 24, 1859; Verein für Naturkunde, Wiesbaden, December 23, 1859, acknowledging the receipt of the Society's publications; Société de Physique, &c., de Genéve, November 5, 1859; Linnæan Society, London, May 5, 1859, acknowledging the same, and presenting their own publications; Verein für Naturkunde, Wiesbaden, December 23, 1859; K. K. Akademie, Wien, December 17 and July 7, 1859; Académie Royale, &c., Stockholm, November 25, 1859, presenting various publications; Joseph Hyrtl, Vienna, May 4, 1860, acknowledging his election as Honorary Member; and Jules Marcou, Salins, May 23, acknowledging his election as Corresponding Member.

Mr. F. W. Lincoln, Jr., of Boston, was elected a Resident Member.

DONATIONS TO THE MUSEUM.

April 4, 1860. Two specimens of *Gobio fluviatilis*, and one each of *Phoxinus varius*, *Leuciscus rodens*, *L. praxinus*, *L. dobula*, *Tinca chrysithys*, *Perca fluviatilis*, *Esox lucius*, and *Coregonus marenula*, from Lake Neufchatel; and *Salmo fario* from the rivers of Switzerland; by the Museum of Comparative Zoölogy, Cambridge. An extensive collection of fishes, crustaceans, mollusks, and radiates, from Maui, Sandwich Islands; by Dr. C. F. Winslow. Skeletons of male gray wolf from Wisconsin; of male and female cross fox, and of porcupine, from Portage Lake, Michigan; by Dr. S. Kneeland, Jr. Canada lynx, entire specimen; by Mr. John Sears. Specimens of *Astacus* from Lake Neufchatel; by the Museum of Comparative Zoölogy, Cambridge. West Indian crocodile (*Crocodilus acutus*, Geoffr.); by Dr. J. N. Borland.

April 18. Skull of an Indian from Fox River, Appleton, Wisconsin; by Dr. M. Tompkins. A lump fish (*Cyclopterus lumpus*) from Holmes Hole; by Dr. D. H. Storer. A red-bellied terrapin (*Emys rubriventris*) from Virginia; by Mr. J. A. Cutting.

May 2. 160 of the grasses of the northern United States; by Mr. C. J. Sprague. An agouti, wolf fish, and iguana; by Mr. J. A. Cutting.

May 16. Florida rat, embryos of egret, tracheæ of birds, brain of turkey-buzzard, fractured jaw of *Ursus Americanus*, from Florida; by Dr. H. Bryant. Skins of California squirrel (*Sciurus fossor*) and prairie squirrel (*Cynomys Ludovicianus*); by the Smithsonian Institution. Two human brains; by Dr. C. Ellis. Skulls of monkey (*Cercopithecus*) from Africa, and of skunk (*Mephitis mephitica*); by Mr. W. B. Gibson. Several fishes, crustaceans of the genera *Cambarus*, *Gelasimus*, and *Chlorodius*, two myriapods, and the pupa of a dragon-fly, from Florida; by Dr. H. Bryant. A living horned lizard (*Phrynosoma*) from Texas; by Mr. H. J. Doniphan. Specimen of shale with adhering coal from the Albert mine, New Brunswick; by Prof. W. B. Rogers.

June 6. Horns of the hartebeest (*Boselaphus caama*, Gray) from Africa; by C. J. Sprague. Skulls of a female deer (*Cervus Virginianus*), fox (*Vulpes fulvus*), and great white heron (*Ardea occidentalis*), land and fresh-water shells, and a living ophisaurian reptile, from Florida; by Dr. H. Bryant. Skeleton of a monkey (*Semnopithecus*); by W. B. Gibson. Egg of the New Holland emu; by Dr. S. Durkee. Cysticercus form of the *Tænia crassicollis*, in the liver of a rat; by D. Mack. A white, living *Gordius*, from S. Natick, Mass.; by W. Edwards.

June 20. A young seal; by S. N. Chamberlain. Fœtal dog-fish; by. D. Mack. Star-nosed mole from Massachusetts; by A. Durant.

BOOKS RECEIVED DURING THE QUARTER ENDING JUNE 30, 1860.

J. J. Anthony. Descriptions of new species of American Fluviatile Gasteropods. 8vo. Pamph. *From the Author.*

W. Stimpson. Prodromus descriptionis Animalium evertebratorum, &c. Pars VIII. *From the Author.*

Twelfth Annual Report of the Regents of the University of New York. 8vo. Pamph. Albany. *From the Regents.*

H. Wagner. Cryptogamen — Juncaceæ, Cyperaceæ, Gramineæ. 12mo. Bielefeld, 1854. *From S. Urbino.*

Nettle, R. Salmon Fisheries of the St. Lawrence. 12mo. Montreal. *From the Author.*

Institutes of Medicine. By Martyn Paine, LL. D., M. D. 8vo. New York, 1859. *From the Author.*

Griffith, J. W., and Henfrey, H. Micrographic Dictionary. 8vo. London, 1856. *From Dr. S. Durkee.*

Forty-second Annual Report of the Trustees of the New York State Library. 8vo. Pamph. Albany, 1860. *From the Trustees.*

Beiträge zu der Insekten Geschichte herausgegeben. Von Ludwig Gottl. Scriba. Parts 1, 2, 3. 4to. Frankfurt, 1790–93.

Kennzeichen der Insekten. Von J. H. Sulzer. 4to. Zurich, 1761. *From Dr. Algernon Coolidge.*

Sketches of Washoe Silver Mines. By H. Degroot. 8vo. Pamph. San Francisco, 1860.

Review of Darwin on the Origin of Species. By John Amory Lowell. 8vo. Pamph. Boston, 1860. *From C. K. Dillaway.*

J. Jonstonus. History of the Wonderful Things of Nature. 8vo. London, 1657. *From Dr. C. T. Jackson.*

Dr. Jeffries. Narrative of two Aërial Voyages of Dr. Jeffries with Mons. Blanchard. 4to. London, 1786. *From Dr. B. J. Jeffries.*

Vegetable Structures in Coal. By J. W. Dawson, LL. D. 8vo. Pamph. London, 1860.

Silurian and Devonian Rocks of Nova Scotia. By J. W. Dawson, LL. D., &c. 8vo. Pamph. *From the Author.*

Durand, E. Biographical Notice of the late Thomas Nuttall. 8vo. Pamph.
Sketch of the Botany of the basin of the Great Salt Lake of Utah. 4to Pamph. *From the Author.*

L. R. Gibbes. Botany of Edings's Bay. Description of Ranilia muricata. On a convenient form of Aspirator. Past and Present Condition of Niagara Falls. 8vo. Pamph. 1860.
Rules for accentuation of names in Natural History. By the same. 4to. Pamph. *From the Author.*

Denkschriften der K. K. Akademie der Wissenschaften. Math.-Naturw. Classe. Sechszehn. Band. 4to.
Sitzungsberichte der K. K. Akademie der Wissenschaften. Math.-Natur. Classe. Band XXXIII., No. 27–29, XXXIV.–VII., No. 1–20. 8vo.
Sitzungsberichte Math.-Naturw. 1858. No. 27–29. 1859. No. 1–9.
Proceedings of the Royal Geographical Society of London. Vol. IV. No. 1. 8vo.
Memoirs of the Geological Society of India. Vol. 1. Part 3. 8vo. Pamph.
Annual Report of the Superintendent of the Geological Survey of India. 8vo. Pamph. Calcutta, 1858–9.
Jahrbucher des Vereins für Naturkunde. Dreizehntes Heft. 8vo. Wiesbaden, 1858.
Canadian Journal of Industry, &c. No. 29, for May, 1860. Toronto.
Kongliga Svenska Fregatten Eugenies, &c. Zoölogi III. 4to.
Mémoires de la Société de Physique et d'Histoire Naturelle de Genéve. 4to. Tome XV. Première Part. Genéve.
Journal of the Proceedings of the Linnæan Society of London. 8vo. Vol. II., Nos. 7, 8, III., 9–15. Supplement, Nos. 1, 2, (Botany.) Also II., 7, 8, III., 9–15, (Zoölogy.) List of Members for 1858–9. 8vo. Pamph. Addresses by T. Bell, F. R. S. 8vo. Pamph.
Transactions of the Linnæan Society of London. Vol. XXII. Parts 3, 4.
Jahrbücher der K. K. Central-Anstalt für Meterologie und Erdmagnetismus. Von Karl Kreil. VI. Band. Jahr. 1854. 4to. Wien.
Archiv für Naturgeschichte. 3, 4. 1859.
Mémoires de la Société Royale des Sciences de Liége. Tome 14.
Entomologische Zeitung. 6 Vols. 8vo. Stettin, 1854–9.
Catalogus Coleopterorum Europæ. 12mo. Pamph. Stettin, 1859.
Catalogus Hemipterorum. 12mo. Pamph. Stettin, 1859.
Jahrbuch der K. K. Geologischen Reichsanstalt. 1859. X. Jahrgang. No. 2. April, May, June. 8vo. Wien.
Ansprache gehalten an Schlusse des ersten Decenniums der K. K. Geologischen Reichsanstalt. Von W. Haidinger. 8vo. Pamph. Wien, 1859.
Kongliga Svenska Vetenskaps-Akad. Handlingar. Ny Följd Andra Bandet. Första Häftet. 1857. 4to.
Ofversigt af Kong. Vetenskaps-Akad. Förhandlingar. 8vo. Femtonde Argängen. 1858.
Gelehrte Anzeigen. Vols. 47, 48. 4to. München, 1858–9.
Dr. C. F. P. von Martius. Eine Rede zur Feier des Akad. Sæcularfestes. 4to. Pamph. München, 1859.
L. Seidel. Untersuchungen über die Lichtstärke der Planeten Venus, Mars, Jupiter, und Saturn. Nebst einem Anhange enthaltend die Theorie der Lichterscheinung des Saturn.

Wurtt. Naturwissenschaftliche Jahreshefte. 1. 1860. 8vo. Stuttgart.

Special Meeting of the American Geographical and Statistical Society. 8vo. Pamph. New York, 1860.

Silliman's American Journal of Science and Arts. Vol. XXIX. No. 87, for May, 1860.

Mémoires de l'Académie Impériale des Sciences, &c., de Dijon. Deuxième Série. Tome VII. 8vo. 1859.

Actes de l'Académie Impériale des Sciences, &c., de Bordeaux. 8vo. Pamph. Vingt-Unième année. 2e Trimestre. Paris, 1859.

Malakozoölogische Blätter. 5 Nos. 8vo. Pamph.

Pfeiffer, L., Dr. Monographia Heliceorum viventium. Vol. IV. Lipsiæ, 1859.

Proceedings of the Zoölogical Society of London. With Illustrations. 8vo. 1859.

American Geology. By Eben. Emmons. Part 1. 8vo. Albany, 1854.

Transactions of the American Philosophical Society. Vol. XI. Part 3. 4to. Philadelphia, 1860.

Proceedings of the same. Vol. VII. No. 63. 8vo. Pamph.

Laws, List of Members, &c., of the same. 8vo. Pamph.

Proceedings of the American Antiquarian Society. 8vo. Pamph. June, 1860. Boston.

American Medical Times. 4to. No. 1, Vol. 1. New York.

Proceedings of the Academy of Natural Sciences at Philadelphia. Sigs. 6–12. 8vo.

Canadian Naturalist and Geologist, for April, 1860. Vol. V. No. 2.

Journal of the Geological Society of Dublin. Vol. VIII. Part 2. 1859.

New York Journal of Medicine. No. 102, for May, 1860. *Received in Exchange.*

Annals and Magazine of Natural History. Vol. V. Nos. 27, 28, and 29, for March, April, and May, 1860.

Quarterly Journal of the Geological Society. Vol. XVI. Part 2. London. *From the Courtis Fund.*

Diary of the American Revolution. By Frank Moore. 8vo. New York, 1860.

James Savage. Genealogical Dictionary of the First Settlers of New England. Vols. 1 and 2. 8vo. Boston.

History of the Republic of the United States of America. By John C. Hamilton. Vols. 3, 4, 5, 6. 8vo. New York, 1859.

History of the United States. By George Bancroft. Vol. VIII. Boston, 1860. *Deposited by the Republican Institution.*

September 5, 1860.

The President in the Chair.

Dr. A. A. Hayes, on presenting a "Report on Supplying the City of Charlestown, Mass., with Pure Water," made some additional observations on the analyses of the water, and on the phenomena connected with the tides at Mystic Pond.

Mr. Temple Prime, of New York, presented a paper entitled:

SYNONYMY OF THE SPECIES OF CYRENELLA, A GENUS OF MOLLUSCA BELONGING TO THE FAMILY OF THE LUCINIDÆ. BY TEMPLE PRIME.

CYRENELLA, Deshayes.

VENUS, Desh. Coq. Foss. Par. 1824. CYRENELLA, Desh. Soc. Philom. 1833. CYRENOIDA, Joannis. Mag. Zoöl. 1835. CYRENELLA, Desh. Loc. sup. cit. 1835. CYCLAS. Fer. Cat. 20, 1837. CYRENOIDES, Morelet. Test. Cub. 1851.

1. CYRENELLA ALATA, Adams.

Cyrenoïda alata, Adams and Reeve. Voy. Samarang, 80, pl. xxiv. f. 12, 1850. Hab. Corean Archipelago.

2. CYRENELLA AMERICANA, Morelet.

Cyrenoides Americanus, Morelet. Test. Nov. Cub. pt. 2d, 26, 1851. Hab. Central America.

3. CYRENELLA COREËNSIS, Adams.

Cyrenoïda Coreënsis, Adams and Reeve. Voy. Samarang, 80, pl. xxiv. f. 14, 1850. Hab. Corean Archipelago.

4. CYRENELLA CUMINGI, Sowerby.

Cyrenoïda Cumingi, Sowb. Hanl. Wood's suppl. Cat. pl. xv. f. 5, 1854. Hab. Philippines.

5. Cyrenella Dupontia, Joannis. Desh. Mag. Zoöl., class. v. 70, 1835.

Cyrenoida Dupontia, Joannis. Loc. sup. cit. class. v. pl. 64, f. 1–3, 1835.

Cyclas Dupontia, Ferussac. Cat. 20, 1837. Hab. Senegal.

6. Cyrenella lenticularis, Desh. Proc. Zoöl. Soc. xxii. 341, 1854.

Cyrenoida lenticularis, Adams. Rec. Gen. ii. 452, 1858. Hab.?

7. Cyrenella lucinoides, Desh. Trait. elem. Conch. ii. 818, pl. xiv. bis f. 10–12, 1853.

Venus lucinoides, Desh. Desh. Coq. Foss. Par. 1, 146, pl. xxiii. f. 12, 13, 1824. Hab. France, (fossil.)

8. Cyrenella Moretonensis, Desh. Proc. Zoöl. Soc. xxii. 341, 1854. Hab. Moreton Bay, Australia.

9. Cyrenella oblonga, Sowerby. Proc. Zoöl. Soc. xxii. 341, 1854.

Cyrenoida oblonga, Sowb. Hanl. Wood. suppl. Cat. pl. xv. f. 6, 1854. Hab. Philippines.

10. Cyrenella Philippinarum, Sowb. Proc. Zoöl. Soc. xxii. 340, 1854. Hab. Philippines.

11. Cyrenella pisiformis, Desh. Proc. Zoöl. Soc. xxii. 341, 1854. Hab. Philippines.

12. Cyrenella Senegalensis, Desh. Proc. Zoöl. Soc. xxii. 341, 1854.

Cyrenoida Senegalensis, Desh. Adams, Rec. Gen. ii. 452, 1858. Hab. Senegal.

13. Cyrenella sphæricula, Desh. Proc. Zoöl. Soc. xxii. 340, 1854. Hab. Moreton Bay, Australia.

14. CYRENELLA TUMIDA ?

Mysia tumida. Nutt.
Cyrenoida tumida. Jay's Cat. iv. ed. 33, 1850. Hab. ?

Mr. Temple Prime presented also the following paper :

SYNONYMY OF THE KNOWN SPECIES OF RANGIA, A GENUS OF THE FAMILY MACTRACEA.

RANGIA, Desmoulins.

CLATHRODON, Gray, MSS. RANGIA, Desmoul. Soc. Linn. Bord. v. 1831. Conrad, Marine Conch. 1831. CLATHRODON, Gray. Conrad, Amer. Il. xxiii. 1833. MACTRA. Conrad, Amer. Il. xxiii. 1833. GNATHODON. Rang. Ann. Mus. n. ser. iii. 1834. Gray, London Mag. N. Hist. n. ser. i. 1837.

1. RANGIA CYRENOIDES, Desm. Act. Soc. Linn. Bord. v. 48, pl. 1, 1831. Conrad, Marine Conch. 57, pl. 13, 1831. Adams, Rec. Gen. ii. 380, 1858. Conrad, Proc. Ac. N. S. Phil. 232, 1860.

Clathrodon cuneata, Gray. Conrad, Amer. Il. xxiii. 340, 1833.
Gnathodon cuneatus, Gray. Lond. Mag. N. Hist. n. ser. i. 77, f. 34, 1837. Hab. N. America.

2. RANGIA CLATHRODONTA, Conrad. Proc. Ac. N. S. Phil. 232, 1860.

Mactra clathrodonta, Conrad. Amer. Il. xxiii. 340, 1833.
Gnathodon Grayi, Conrad. Foss. Test. form. 23, pl. 13, f. 1. Hab. N. America (fossil.)

3. RANGIA FLEXUOSA, Conrad. Proc. Ac. N. S. Phil. 232, 1860.

Gnathodon flexuosa, Conrad. Amer. Il. xxxviii. 92, 1840. Hab. N. America.
Rangia Grayi, Conrad. Foss. Test. form. 23, pl. 13, f. 1, is *Rangia clathrodonta*, Conrad.

4. Rangia Lecontei, Conrad. Proc. Ac. N. S. Phil. 232, 1860.

Gnathodon Lecontei, Conrad. Il. Ac. N. S. Phil. 1853. Hab. N. America.

5. Rangia mendica, Gould. Conrad, Proc. Ac. N. S. Phil. 232, 1860.

Mactra mendica, Gould. Proc. Bost. Soc. N. H. iv. 88, 1851.
Gnathodon trigonum, Petit. Il. Conch. iv. 84, 1853.
Gnathodon mendica, Gould. Proc. Zoöl. xxiv. 200, 1856.
Rangia trigona, Petit. Adams, Rec. Gen. ii. 380, 1858. Hab. N. America.

6. Rangia minor, Conrad. Proc. Ac. N. S. Phil. 232, 1860.

Gnathodon minor, Conrad. Foss. Test. form. 69, pl. 39, f. 6. Hab. N. America.

7. Rangia parva, Petit. Adams, Rec. Gen. ii. 380, 1858. Conrad, Proc. Ac. N. S. Phil. 232, 1860.

Gnathodon parvum, Petit. Il. Conch. iv. 358, pl. 13, f. 9, 10, 1853. Hab. New Holland.

8. Rangia rostrata, Petit. Adams, Rec. Gen. ii. 380, 1858.

Gnathodon rostratum, Petit. Il. Conch. iv. 84, 1853.
Rangia flexuosa, Conrad. Proc. Ac. N. S. Phil. 232, 1860. Hab. N. America.
Rangia trigona, Petit. Adams, Rec. Gen. ii. 380, 1858, is *Rangia mendica*, Gould.

While preparing this paper, there appeared in the June number of the Proceedings of the Academy of Natural Sciences of Philadelphia Mr. Conrad's Synopsis of the genus *Rangia*. It will be seen, however, that the views here taken are not always the same as those of Mr. Conrad.

Dr. A. A. Hayes exhibited a very fusible white mineral from Lake Superior, containing boracic acid; it was a silicate and borate of lime, and was obtained from the region of the Minnesota copper mine.

Dr. Kneeland observed that the same substance is abundant in the Portage Lake region, and exhibited from the Cabinet of the Society a large specimen obtained by him from the Isle Royale Mine.

A letter from Dr. W. H. Myers, of Fort Wayne, Ind., proposing to exchange shells for the Society's Proceedings, was referred to the Curator of Conchology and the Committee on Publications.

Dr. Kneeland presented a small framed engraving of J. J. Audubon, as he appeared in the later years of his life.

Mr. Paul B. Du Chaillu was elected a Corresponding Member; and Messrs. Nathaniel L. Hooper and J. H. Woodbury, of Boston, Resident Members.

September 19, 1860.

The President in the Chair.

Dr. Henry Bryant gave an account of a recent visit to the coast of Labrador.

He found Brünnich's guillemot (*Uria Brünnichii*, Sab.) and the bridled guillemot (*Uria marmorata*, Lath.) breeding abundantly on Gannet Rock, a locality considerably farther south than they have been generally supposed to breed.

Dr. C. T. Jackson gave an account of a visit to some old mines in the vicinity of Franconia, N. H., which had been recently reöpened, viz.: the Franconia iron mine, one of rich argentiferous galena at Warren, and a copper mine at Bath.

Dr. Jackson announced that he had discovered andalusite macle in an altered argillaceous slate, in place, on the road recently made on the side of Mt. Washington.

At Boar's Head, near Rye, N. H., are boulders containing this, which must have come from this locality on the easterly side of the mountains. It is interesting to be able to add another to the few localities in the United States where these beautiful crystals are found.

Dr. White exhibited the fungous growth commonly called California beer seed undergoing its development in a solution of molasses and water; much carbonic acid is evolved from this, and an excellent beer may be made from it if properly flavored.

The growth is very rapid, and consists of the spores of a fungus, somewhat resembling, though they are larger and rounder, those of the yeast plant (*Torula*). The spores, by their aggregation, form masses of the size and shape of popped corn. It is said to grow upon a tree in California.

The President exhibited a fossil from the southwest frontier of the United States.

The matrix was calcareous, and imbedded in it was a portion of the skull of the Capybara, the largest of the rodents, now confined to South America. Its principal interest consisted in its showing the narrowing down of the geographical distribution of this species, as the animal has never been found living in North America nor in the vicinity of the Isthmus in South America.

Messrs. William N. Eayrs and John McKay, of Boston, and William Ellery Copeland, of Roxbury, were chosen Resident Members.

DONATIONS TO THE MUSEUM.

September 5, 1860. An African monkey (*Colobus satanas*) and a sacred ibis; by Paul B. Du Chaillu. A South American boa; by Wm. A. Lerow. A green snake (*Coluber vernalis*) from the White Mountains; by S. D. Crane. An echinus (*Encope subclausa*) from the head of the Gulf of California; by Lieut. C. H. B. Caldwell, U. S. N. Three injected bull-frogs; by E. Samuels. Three centipedes and a large scorpion from Singapore, an echinus from the Cape of Good Hope, portions of the spines of the halibut and blue-fish, and a large beetle from

Brookline; by Dr. S. Kneeland, Jr. A Florida lobster and two European goldfinches; by James A. Cutting. A mud eel (*Siren lacertina*); by Dr. A. S. Baldwin, of Jacksonville, Fla. A paper-like web, said to have been made by a fig worm; by Miss Lydia B. Felt.

September 19. A complete skeleton of a young seal (*Phoca vitulina*) and a skull of the same, 7 skulls of the harp seal (*P. Grœnlandica*), the skull of a larger species of seal, 4 teeth of the killer (grampus), some univalve shells (*Buccinum*), and rocks containing fossils, all from Labrador; by Dr. Henry Bryant. A young snake, and an egg containing an embryo snake (probably of the black snake), from Scituate; by Dr. John Bacon. A large boa constrictor and 2 pipe fishes (*Syngnathus*); by James A. Cutting.

BOOKS RECEIVED DURING THE QUARTER ENDING SEPT. 30, 1860.

Catalogue of Lepidopterous Insects at East India House. By Thomas Horsfield, F. R. S., &c., and Fred. Moore. 8vo. Vol. 2. London, 1858–9. *From the Secretary of State of India.*

Bulletin of the Wisconsin Agricultural and Mechanic Association. 8vo. Pamph. Vol. 1. pp. 1–16. 1860. *From I. A. Lapham, Secretary.*

New Orleans Medical and Surgical Journal. Sept. 1860. 8vo. Pamph. pp. 609–624. *From Dr. B. Dowler.*

Proceedings of the American Association for the Advancement of Science. 13th meeting. 8vo. Cambridge, 1860. *From the Association.*

Edinburgh New Philosophical Journal. Nos. 21, 22. New series. (Vol. XI. Nos. 1, 2.) *From Prof. H. D. Rogers.*

Report of the Commissioner of Patents for 1859. Agriculture. 8vo. Washington. *From the Commissioner.*

A. Kölliker. Ueber die Beziehungen der Chorda dorsalis zur Bildung der Wirbel der Selachier und einiger andern Fische. 8vo. Pamph. Würzburg, 1860. *From the Author.*

Annual of Scientific Discovery for 1850, 1851. 2 vols. 12mo. *From Dr. Samuel A. Green.*

The same for 1859. Boston. *From Dr. A. A. Gould.*

Mining Magazine. Edited by Wm. P. Blake. Vol. 1. Nos. 1 to 6. Nov. 1859 to July, 1860. New Haven. *From the Editor.*

Catalogue of Phænogamous and Filicoid Plants. By Edward Tatnall. 8vo. Pamph. Wilmington, Del., 1860. *From the Author.*

Report on Supplying the City of Charlestown with Pure Water. By G. R. Baldwin and C. L. Stevenson. 8vo. Pamph. Boston, 1860. *From Dr. A. A. Hayes.*

Engraved portrait of John J. Audubon. *From Dr. S. Kneeland, Jr.*

Check list of the Shells of North America. Terrestrial Gasteropoda. By W. G. Binney. 8vo. Pamph.

Catalogue of the Terrestrial and Fluviatile Gasteropods inhabiting North America. By W. G. Binney. 8vo. Pamph. *From the Author.*

J. Watts de Peyster. Life of Leonard Torstenson. 8vo. Poughkeepsie, 1855.

History of Carausius, &c. 8vo. 1858.

The Eclaireur, A Military Journal. Vols. 1, 2, 3. 8vo. 1853–55.

The Dutch at the North Pole and the Dutch in Maine. 8vo. Pamph.

The Dutch Battle of the Baltic. 8vo. Pamph.

Proofs considered of the early Settlement of Acadie by the Dutch. 8vo. Pamph.

Description of medals presented to J. Watts de Peyster. 8vo. Pamph. *From the Author.*

Draper, L. C. School Reports. 8vo. Wisconsin.

Proceedings of the American Academy of Arts and Sciences. Vol. IV. pp. 249 to end. 8vo. Boston.

Proceedings of the Academy of Natural Sciences of Philadelphia. Sigs. 12–24. 1860.

Canadian Naturalist and Geologist. Vol. V. Nos. 3 and 4, for June and August, 1860. Montreal.

Smithsonian Contributions to Knowledge. Vol. XI. 4to. Washington, 1860.

Catalogue of the Library of the Massachusetts Historical Society. Vols. 1, 2. 8vo. Boston, 1860.

J. D. Morris. Catalogue of the Lepidoptera of North America. 8vo. Pamph. Washington, 1860.

Check lists of the Shells of North America, prepared for the Smithsonian Institution by Isaac Lea, &c. 8vo. Pamph. 1860.

Canadian Journal of Industry, &c. No. 28. July, 1860. Toronto.

Transactions, &c., of the American Antiquarian Society. Vol. IV. 8vo. 1860.

Transactions of the Wisconsin State Agricultural Society. 2 vols. 8vo. 1854–59.

Wisconsin Historical Collections. Vols. 3, 4. 8vo. 1856, 1858.

Silliman's American Journal of Science, &c. Vol. XXX. Nos. 88 and 89, for July and September, 1860. 8vo. New Haven.

Archiv für Naturgeschichte. V. 8vo. Berlin, 1859.

Actes de l'Académie Impériale des Sciences, &c. 21e année. 3e Trimestre. 8vo. Paris, 1859.

Der Zoölogische Garten. Dr. D. F. Weinland. 1 Jahrgang. Heft 1 bis 6. 8vo. Frankfurt am Main, 1860.

Verhandlungen des Naturhistorischen Vereins der Preussischen Rheinlande und Westphalens. Bogen 1–28. 8vo. Bonn.

Sitzungsberichte der K. Akademie der Wissenschaften. Math.-Natur. Classe. Band XXXVII., Nos. 21, 22, XXXVIII., Nos. 23–28, XXXIX., Nos. 1, 2. 8vo. Wien.

Mémoires de l'Académie Impériale des Sciences de St. Pétersbourg. 7e Série. Tome I. Nos. 1–15. Bulletin, &c. Tome I. Feuilles 1–9. 4to.

Physik. Abhandlungen der König. Akademie der Wissenschaften. 1858. Math. Abhand. &c. 1858. 4to. Berlin. Monatsberichte, &c. 1859. 8vo. Berlin. *Received in Exchange.*

Quarterly Journal of the Geological Society. Vol. XVI. Part 3. Aug. 1860.

C. M. Diesing. Systema Helminthum. Vol. I. 8vo. Vindobonæ, 1850.

Annals and Magazine of Natural History. Vol. V, No. 30, and Vol. VI, Nos. 32, 33, for June, August, and September, 1860. London. *From the Courtis Fund.*

Encyclopædia Britannica. Vol. XX. 4to. 1860. *Deposited by the Republican Institution.*

October 3, 1860.

Dr. C. T. Jackson, Vice-President, in the Chair.

Prof. Edward Hitchcock, of Amherst, made a communication on the conglomerate of Vermont, which contains elongated, flattened, and curved pebbles of quartzose nature, and sometimes of pure hyaline quartz; this subject had been formerly presented to the Society by his son (see meeting of Jan. 4, 1860.)

His observations had been made at Newport, where these distorted pebbles were first noticed, and at Wallingford and Plymouth, Vt., in the Green Mountains. He exhibited diagrams, showing the size, shape, and relation of these pebbles to the conglomerate enclosing them, and the gradual passage of the rounded and water-worn masses into the folia of the schists. At Newport the greatest elongation is in the direction of the strike, but in Vermont in the direction of the dip; in Plymouth he had found the pebbles of one surface continuous with the schistose laminæ of another. In some localities this quartzose conglomerate is intimately associated with gneiss, and seemingly a variety of it; he had no direct proof of this, but believed that there is a continuous series of changes from these quartzose elongated pebbles, through the talcose and micaceous schists, to the gneiss, — that all are varieties of the same rock. The gneiss of the Green Mountains has these conglomerates and schists on the east and west sides, the former being the uppermost. He drew a section of the mountains from Wallingford to Plymouth, embracing an extent of surface of about eleven miles, where these rocks occupy similar positions on each flank; according to appearances here presented, the dip of the strata indicates an immense amount of denudation.

He adhered to the opinion that these pebbles have been bent since their deposition, and while they were in a plastic state; they are not only elongated, but indented and curved around each other in some localities; the simple curvature of the strata might explain the elongation in the line of strike, but not the other phenomena presented. Some of these pebbles in Vermont are pure quartz.

To explain this he invoked the aid of chemistry, and the well-known action of hot water containing alkalies in solution in softening and decomposing silicates, extracting some ingredients and combining others, the form of the rock remaining unchanged.

Prof. Hitchcock exhibited some very distinct specimens of graptolite, a coralline fossil, from the rocks of Vermont.

Dr. C. T. Jackson expressed the same opinion as on a former occasion, that the pebbles found at Newport and in this State, as at Roxbury, were formed mechanically by being rolled upon beaches by the surf; even the distortions and indentations might be accounted for in this way, their parallels being now in process of formation on the beaches of this State and of Maine. But in regard to these Vermont pebbles, he believed that they might have been formed from the rock, but not the rock from the pebbles as Prof. Hitchcock maintains. In support of this view, he referred to the experiments of M. Daubrée, showing how silicates become soluble under moderately hot water in presence of alkalies, the quartz being separated and crystallized. In contrast with the immense denudation which has taken place in the North, he mentioned that in some places at the South, as at Dahlonega, Ga., the rocks are so decomposed and soft as to allow of being shovelled to a depth of 80 to 100 feet, none of the surface having been subjected to drift or denuding agencies.

Dr. A. A. Hayes, in reference to the mineral from Lake Superior containing boracic acid, mentioned at the first September meeting, observed that it presented two points of special interest: one is that, though very compact, it shows the composition of datholite better than the crystalline form of this substance; the other is its economical value; as it contains $22\frac{1}{2}$ per cent. of boracic acid, if abundant, it might be collected with commercial advantage.

In reply to a question of Mr. Kidder in relation to the animals which eat the piles in Boston Harbor, Dr. A. A. Gould replied that, though popularly called worms, they are minute crustaceans, the *Limnoria terebrans;* they are about $\frac{3}{20}$ of an inch long.

The Treasurer reported that the note to the Corresponding Secretary read at the last meeting was intended as a notice of the bequest of Mr. Phillips, and that the Executors were waiting the action of the Society.

It was, therefore, voted "that the Society accept the bequest of the late Hon. Jonathan Phillips."

It was also voted "that the Treasurer be authorized to receive the amount in behalf of the Society, and to give to the Executors of his estate a satisfactory discharge for the same."

Dr. Christopher Johnston, of Baltimore, Md., was elected a Corresponding Member, and H. P. Binney, of Boston, a Resident Member.

October 17, 1860.

The President in the Chair.

A letter was read from Mr. H. D. Thoreau, of Concord, Mass., in reference to a Canada lynx (*Lynx Canadensis*) killed in Carlisle, Mass., Sept. 9, 1860.

This animal was a female, as large as any of its kind described, and had *naked* soles. Audubon and Bachman, in the Quadrupeds of North America, and Emmons, in the Massachusetts Reports, give *hairiness* of the soles as a specific character of the Canada lynx, as distinguishing it from the bay lynx (*L. rufus*), which has naked soles. Baird, in his Report on the Mammals of North America, mentions having received a specimen of the Canada lynx in summer pelage, in which the pads of the feet were distinctly visible, not being overgrown as in winter specimens. It appears from these specimens that hairiness of the soles is not a specific character in the Canada lynx. In Mr. Thoreau's animal there is a distinct black line commencing at the eye and terminating in the black portion of the ruff; he believes that some of the specimens killed in this vicinity of late years, and called bay lynx, were the Canada lynx.

Mr. S. H. Scudder gave an account of a recent visit to Lake Winnipeg and the Saskatchawan River, having ascended the latter about one hundred and fifty miles.

Near Red River, not far from Dayton, Minn., the limit between the rolling and the level prairie is very abrupt; this river is very crooked, with a general current of $1\frac{1}{2}$ miles an hour, and with occasional rapids; the streams opening into it, though small, all have names, being important on account of the growth of timber which is found along the banks, even of the smallest, and nowhere else. The navigation is not impeded by fallen trees, as they stand back 40 to 60 feet from the water; they are principally aspen, oak, and elm; the reason of this position of the trees is that the river flows to the north, and the ice breaks up soonest at the source; the ice not being floated down by the current below forms high dams which go along slowly, grinding down all the trees on the sides of the stream within the reach of high water; there is a level prairie on each side.

The west shore of Lake Winnipeg is a sandy beach, 20 to 30 yards wide, and beyond this is a vast marsh of tamarack and spruce; the eastern shore is granitic, rising into low mounds covered with trees, the western being limestone with some sandstone; in some places are large collections of rounded stones, larger than paving stones, often thirty feet high, thrown up by the waves of this narrow lake. It is shallow, and rendered turbid by very slight winds; the northern portion, above Cape Kitchinashi, is clear; near Gull Island the shore was lined with the cast-off skins of *Ephemeridæ*, forming a kind of windrow miles in length, concealing the sand, and at least a foot in width; the flying *Ephemeridæ* were very abundant and the mosquitoes, as seen at a distance, appeared like small clouds.

The Saskatchawan River is very rapid, and its banks are for the most part vast marshes; the same marshy character prevails as far as he went, for one hundred and fifty miles or more west of the lake, rendering the country unfit for cultivation.

Prof. Agassiz made a communication on the age of some of the sandstones of North America, generally considered as the Old Red Sandstone.

Some of these had been designated by Mr. Marcou as Triassic, and he showed by characteristic calamites that the strata so named by the latter in New Brunswick were properly so called. The calamites exhibited from the strata of southern New Brunswick had a more elongated stem, fewer vertical furrows, and a greater distance between the joints, than the Carboniferous and Devonian forms, and had the aspect of Triassic calamites. He thought the New Brunswick fossils were different from the *C. arenaceus* of the Trias of Europe.

Mr. Marcou made a communication on the black slate of Braintree, Mass., containing *Paradoxides*, and on similar strata in Newfoundland, near Lake Champlain, and in the vicinity of Quebec.

The Braintree slate contains trilobites, and a *Conocephalus* has been discovered in the same formation in Newfoundland; here are two remotely separated points in North America, whose fossils indicate an age anterior to the Silurian, belonging to what Barrande calls the *faune primordiale.* Prof. James Hall found near Lake Champlain three trilobites in strata which he referred to the Hudson River group, or to the second fauna of Barrande; others obtained near Quebec were referred to the same group by Mr. Logan; and this whole chain of rocks has been referred by these and other geologists to the Hudson River group. Emmons long ago discovered these rocks in Vermont, and called them the "Taconic System;" this is equivalent to the primordial fauna of Barrande, and Emmons's name, given in 1846, four years before that of Barrande, should be substituted for *faune primordiale.*

The trilobites found near Quebec were obtained from the rocks at the Falls of Montmorenci; at the surface here is a horizontal limestone belonging to the Trenton group, and the rock which forms the falls is gneiss; below the falls are the black shales, very much upheaved, going back fifteen or twenty miles into the country, and indicating an immense thickness; Mr. Marcou had no doubt that the fossils were found in these shales, which are anterior to the limestone. The Potsdam sandstone, in New York, had until recently yielded only a fossil *Lingula;* afterward a *Conocephalus* was discovered in it; Mr. Marcou considers this not the first fossiliferous stratum, but the last of a series containing the primordial fauna. These primordial forms have been found also in Wisconsin and Minnesota, and in Spain.

Mr. Marcou read extracts from letters of M. Barrande in reference to this subject.

The Corresponding Secretary read the following list of letters recently received:

From Mr. P. B. Du Chaillu, accepting Corresponding Membership; from the Leeds Philosophical and Literary Society, July 13; the K. K. Akademie der Wissenschaften, Wien, June 25; Zoölogisch-Botanische Gesellschaft, Wien; Gesellschaft der Wissenschaften, Göttingen, June 3; Naturforschende Gesellschaft, Emden; Oberhessische Gesellschaft für Natur-und-Heilkunde, Giessen, June 2; the London Geographical Society, July 24; and the Literary and Philosophical Society of Manchester, May 31, acknowledging the reception of the Society's publications, or sending theirs in return.

Messrs. A. S. Bickmore, of Cambridge, and Robert T. Edes, of Dorchester; and Drs. A. D. Sinclair, of Boston, and J. H. Stickney, of Newton; were elected Resident Members.

November 7, 1860.

The President in the Chair.

Mr. Du Chaillu presented descriptions of mammals from equatorial Africa, collected by himself, and believed to be undescribed, as follows: —

(*Continued from page* 304.)

TROGLODYTES KOOLOO-KAMBA. This chimpanzee-like animal was discovered by me in the mountains of the interior, situated near the head waters of Ovenga River, known by the natives under the name of Ashankolo; these mountains are hardly at all inhabited.

Immediately after killing the animal I was struck by the following outward characters, which led me to believe that it was a new species.

The general color of the hair black. The head rounded, the frontal ridge prominent, but less so than in the gorilla; the eyes wide apart; cheek-bones very prominent, and the cheeks hollow; nose very flat; mouth wide, the lips black, of uniform thickness, when shut not showing the mucous membrane; the muzzle not very prominent, and the chin rounded; the ears very large, in their form resembling much those of man, but larger; the round, black face surrounded by whiskers, commencing from the hair of the head and uniting under the chin, this appendage giving a very human look to the animal; the chest broad; the arms long, reaching below the knee, and indicating great muscular strength; the hand long and narrow, black and callous; the thumb very short, the back of the middle phalanx of the fingers callous, showing that the mode of progression is on all-fours, resting anteriorly on the knuckles; abdomen large, and rounded on the sides; the legs short, destitute of a calf; feet black, shorter than the hand; toes free like the fingers, showing the arboreal habits of the animal.

Length of the animal, measured from the dry skin, 4 feet 2 inches, but this may not be the exact length. Length of the hand, $11\frac{1}{8}$ in.; length of the foot from the hairy part of the heel, $10\frac{2}{8}$; length of the thumb, 2 in.; of the second finger, $2\frac{2}{3}$; of the middle finger, $4\frac{2}{3}$; of the fourth finger, $4\frac{1}{4}$; of the little finger, $3\frac{2}{5}$; circumference of thumb, $2\frac{1}{2}$; of second finger, $3\frac{3}{8}$; of middle, 4; of fourth, $3\frac{7}{8}$; of little finger, $3\frac{1}{4}$; length of great toe, $2\frac{6}{8}$; of second toe, $3\frac{1}{4}$; of middle toe, $3\frac{7}{8}$; of fourth toe, $3\frac{5}{8}$; of little toe, $2\frac{6}{8}$; circumference of great toe, $3\frac{2}{3}$; of second toe, $2\frac{1}{2}$; of middle toe, $2\frac{7}{8}$; of fourth toe, $2\frac{1}{2}$; of little toe, $2\frac{1}{8}$.

The chief external characteristic differences between this species and the *Troglodytes calvus* are the want of baldness, the more rounded face, the whiskers round the face, the less prominent muzzle, the higher cheek-bones, and the more hollow cheeks.

It differs from the adult chimpanzee in a rounder face, more prominent cheek-bones, and more hollow cheeks, larger ears, less prominent muzzle, and the whiskers round the face; and, it is important to add, the different name which the natives give to this animal.

The cry of the Kooloo-Kamba is very different from that of the *T. calvus* and chimpanzee, resembling the syllables "Kooloo," which I have heard, and from which it derived its name among the natives, — "Kamba" meaning "to speak," among one tribe; other tribes give to the animal only the name of "Kooloo."

This ape was killed by me in the Ashankolo Mountains. As I was returning to our camp, I heard the cry of "Kooloo, Kooloo," and asked my guide what it was; he said that it was a kind of "man of the woods," which I had not seen before, called Kooloo-Kamba. It was then too dark to go in search of the animal, but a little before daylight the next morning we got up and went toward the place where the ape had retired for the night. Daylight had nearly appeared, and I began to fear that the animal had left, when I was suddenly started by the cry of "Kooloo, Kooloo." I looked above, and saw the animal on the tree on which it had spent the night, and there killed it.

It is very seldom that this animal comes so near the coast, and as we brought it to the camp it was a great object of wonder to the men. It is said to live in the country much farther toward the mountains of the interior. The stomach contained nothing but vegetable food.

Cercopithecus nigripes. The black-footed Guenon, called "Ponday" by the natives. The general color was iron gray, each hair tipped and ringed with yellowish white on the sides, and with rufous on back of the neck and shoulders; lower half of the back, outside of fore legs, and feet of hind legs black; thighs cinereous gray, tipped and ringed with whitish; all the lower parts, and inside of fore-legs and thighs light rufous yellow. On the forehead a patch shaped like a horse-shoe of a yellowish white, terminating behind on a level with the ears; between and to the outside of the arms of the horse-shoe, black; near the tip of the ears on the inside a pencil-like tuft of yellowish rufous hair; face black, almost naked; cheeks hairy, yellowish rufous. Tail: basal half above, blackish mixed with yellowish rufous; terminal half, above and below, black; under surface of basal half of tail, and round the anus, rufous chestnut. Female like the male, the under parts of a lighter tint.

Length to root of tail, 21 inches; tail, 27 inches.

This beautiful species of guenon is found on the banks of the Ofoubour River, and in the mountainous regions of that country; it is one of the least common of the numerous species which inhabit those immense forests.

Otolicnus apicalis. The hair is very soft and woolly, mouse-colored or slaty at base, tipped on the upper parts with various shades of rufous, tinged with cinereous on the head, brightest and with an orange tint on the back and upper part of tail; dorsal median line deep chestnut brown; outside of limbs like back, fading toward the feet; below, mouse-colored, tinged, especially on the interior of hind limbs, with yellowish white; tail rufous for the first half above, the rest of upper and whole lower surface wood brown, with the terminal inch and a half, above and below, dirty yellowish white; hands and feet above hairy to fingers and toes, palms and soles naked; end of nose and chin yellowish white.

Length from nose to base of tail, 10 inches; tail to end of hair, 14 inches. It may well be called the Rufous-backed Galago.

It is called "Abolo" by the natives. It lives in the forests, retiring by day to holes in trees, coming out at night in search of food, which consists of fruit and insects; the male and female commonly dwell together; I kept one for some time, and it throve well, being very fond of cockroaches, bananas, and corn. It is found in the mountains of the interior, near the equator.

Cynogale velox. This resembles the Asiatic *Cynogale Bennettii* (Gray). I have now nothing but the skin of the animal, the skull having been destroyed by fire.

The teeth resemble those of the above genus of Gray, as well as the general appearance, but the size of the animal, the length and characters of the tail, and the habitat, indicate a distinct species.

Description. Head long, very flat; the nose sharp, eyes very small; ears also small, and sparingly clothed with hair; whiskers very stiff and bristly, most of them white; a few bristles of the same character on the cheeks, behind the eyes; neck thick; body stout and depressed; extremities small, the first joint enclosed within the skin of the body; feet five toed, plantigrade behind; soles bare; claws curved and sharp; fore claws very slightly if at all webbed; hind claws partially webbed, and the external border of the tarsus fringed with a membrane; tail stout, compressed laterally, the terminal three fourths sharp above and at the end below, terminating in a point.

Fur short, dense, and soft, near the skin and on the under parts downy, like the under fur of the otter; some coarser hair mixed with the fine fur above; fur extending about one fourth the length of the tail, ending in a point above, and less extended on the under part, the rest of the tail covered with very short, bristly, and closely applied hairs, forming a short crest along the upper edge; the tail in the living animal very shiny, from the shortness of the hair.

Color above, dark, shining brown, lighter on the sides, pale yellowish white below, almost pure white on the throat and chin and along the edge of the upper lip.

Length of the body from tip of the nose to base of tail, 15 inches; length of tail, $8\frac{3}{4}$ in.; length from tip of nose to ears, $2\frac{1}{2}$ in.; length of fore limbs to end of claws, $1\frac{1}{2}$ in.; length of hind limbs, 2 inches.

I have killed three of these animals, two of which were destroyed by fire; all were of the same size.

This extraordinary animal is found in the mountains of the interior, or in the hilly country explored by me north and south of the equator. It is found along the watercourses of limpid and clear streams, where fish are abundant; it hides under rocks along these streams, lying in wait for fish. It swims through the water with a rapidity which astonished me; before the fish has time to move, it is caught; on account of the rapidity of its movements I have given it the specific name of *velox*. The animal returns to land with its prey almost as rapidly as it started from its place of concealment. The great motive power of the animal in the water seems to be in its tail.

Only a single species of *Cynogale* being described, and that a native of Asia, I thought the different shape and proportions of the tail, with its African habitat, were sufficient to make this the representative of a different genus, for which I proposed the name of POTAMOGALE; preferring, however, to wait until I can procure the skull and skeleton, I have placed it in the genus *Cynogale*, to which it certainly bears a close resemblance.

SCIURUS NORDHOFFI. General color above, on the back black, tipped and ringed with orange rufous, on the head and tail tipped with white; last two thirds of tail obscurely ringed with black and white, almost hoary below; anterior limbs outside like the head, hind limbs like the back. Under surface scantily furnished with light rufous hair, grayish toward and on the throat and breast; inside of limbs light rufous; abrupt line of termination between the long hair of the sides and the scanty hair of the abdomen; feet black; whiskers long; teeth deep reddish orange. General character of hair rather harsh.

Length from the tip of the nose to base of tail, 13 inches; length of tail, 13½ inches. It is called "Ncongo" by the natives.

I take great pleasure in naming this species in honor of my friend Charles Nordhoff, Esq., of New York.

This species resembles the *S. caniceps*, (Temm.) but has not the lateral whitish band, nor the rufous spot behind the ears, and has, moreover, the lower parts and the inside of the limbs light rufous, and the tail more hoary beneath. It comes near, also, to the *S. Stangeri*, (Waterh.,) from Fernando Po, but has not the abdomen barred with black.

This squirrel is one of the largest and one of the rarest I have met with in Africa. It is found in the mountainous country situated near the Ashira prairies, at a distance of one hundred and fifty miles from the coast, and one degree south of the equator.

SCIURUS EBORIVORUS. General color above shining black and bright rufous, arising from the hairs being black, ringed with the latter and tipped with the former, the rufous on the head becoming whitish. Lower parts scantily furnished with hair, grayish on the throat and breast, and brownish on the abdomen; feet bright reddish rufous. Tail long, of four different colors, first $2\frac{1}{2}$ inches like the back, next 5 inches bright rufous, mixed with a few shining black hairs, next 5 inches indistinctly ringed with black and white, and last $2\frac{1}{2}$ inches black. Abrupt line of termination between hair of sides and abdomen, grayish along this line; blackish about and behind the ears, which are slightly tufted; hair rather harsh. Length from the tip of the nose to base of tail, $11\frac{1}{3}$ inches; length of tail, 15 inches.

It is called "Mboko" by the natives, and may properly be styled the "ivory-eater."

This species of squirrel is one of the most remarkable animals I have met in western equatorial Africa. The Mboko is known in that region as the great ivory-eater. It shows a curious partiality for ivory, and loves to feed on the newly fallen tusks of the elephant, but does not touch them after they have lain on the ground long enough to lose the animal matter; many tusks are found with the marks of its teeth.

The fame of the Mboko has gone out even among the tribes inhabiting the country where it is not found, and, though it is not met with on the sea-shore between two degrees north and south of the equator, all the tribes know the animal by reputation. The porcupine of this part of Africa is said by the natives to feed sometimes on the tusks of the elephant.

This species was discovered by me in the mountains of the interior, where the Ovenga River takes its source, at a distance of about one hundred and forty miles from the coast, and one degree south of the equator.

Sciurus Wilsoni. General color above mixed rufous and black, the rufous prevailing on the outside of the limbs; lower parts scantily furnished with yellowish rufous hair; throat yellowish white; tail very bushy and silky, with a purplish red tinge, tipped with whitish; whiskers black; teeth reddish orange; abrupt line of termination between hair of the sides and abdomen. Length from the tip of the nose to base of tail, $11\frac{2}{3}$ inches; length of tail, $11\frac{1}{2}$ inches.

I propose the name of *Wilsoni* for this species in honor of my good and dear friend, Rev. John Leighton Wilson, D. D., of New

York, and formerly missionary in Western Africa. I have not the native name of this animal.

The only squirrel that I find described in any way resembling this is the *S. rufobrachiatus*, (Waterh.,) from Fernando Po; but in the latter, the inside of the limbs is reddish rufous instead of yellowish white, and the tail is ringed with black and rufous, instead of purplish red tipped with white.

This squirrel is also one of the rarest I have found in Africa. It is found in the mountainous country situated on the head waters of the Ovenga River, and lives among the trees.

Sciurus subalbidus. In this animal the hair is thicker, shorter, and softer, and the under parts are more densely covered than in most other squirrels of tropical Africa.

The general color above is a mixed rufous, yellowish, and black, darkest and brightest in the middle of the back; each hair is mouse-colored at the base, then ringed with yellowish, yellowish rufous, and black, and tipped with the latter. The yellowish becomes nearly white on the forehead; the lower parts from chin to vent, the inside of fore-arms and thighs, yellowish white, whitest on lower portion of throat; sides more brownish than back, this color encroaching on the lower parts, especially on the anterior half of the abdomen, which is considerably tinged with it; about nose and lips light brown; whiskers long and black; narrow yellowish white circle around eyes; outer side of limbs like the back, more tinged with rufous, and bright bay on the posterior edge of fore and hind limbs, forming a ring just above wrist and heel; the hair reaches above to the beginning of toes, extending beyond the claws; the soles and palms naked; no line of separation between hair of upper and under surfaces of the body; tail much like the middle of back, each hair yellowish rufous at base, and then ringed alternately with black and yellowish rufous, the tip being yellowish white, and almost white near the end of the tail; terminal brush browner; under surface of tail barred with bright bay instead of yellowish rufous; tail distichous; incisors deep orange. Length to base of tail, 10 inches; tail, 11 inches.

From Fernando Po.

It comes near the *S. rufobrachiatus*, (Waterhouse,) but has not the interior of the limbs of a rufous color, which Temminck says is characteristic of the latter species, and the upper incisors are not longitudinally grooved.

SCIURUS RUBRIPES. General color slate tipped with yellow; from the shoulder backward an indistinct yellowish white stripe, fading away before reaching the thighs; lower parts and inside of limbs yellowish white, tinged on the latter with chestnut; head dark chestnut; whiskers black; outside of limbs bright chestnut; tail black, tipped with white above, and chestnut on the under surface; teeth orange yellow. Length from tip of the nose to base of the tail, 9½ inches; length of the tail, 5½ inches.

This resembles the *S. pyrrhopus*, (F. Cuv.,) from the Guinea coast; but the tint is not greenish, the lateral band is yellowish white, the tail differs in its chestnut lower surface and whiter tips, and the head and outside of limbs are chestnut instead of tawny.

This beautiful red-legged squirrel is found in the country watered by the rivers Nazareth, Ogobai, Fernand-Vaz, Rembo, and Ovenga, running through a country situated two degrees south of the equator. It inhabits the forests of equatorial Africa, and is found in the interior as far as I have been. It is called by the natives "Ngori."

SCIURUS MINUTUS. Color bright ferruginous above, beneath tawny; tail with alternate black and rufous bands; base of the fur, above and below, plumbeous; whiskers long and black; muzzle yellowish white; ears scantily furnished with yellowish white hair; teeth whitish yellow, lower incisors diverging at the points; well clothed with hair on the lower parts. Length from tip of the nose to base of tail, 3 inches; length of tail, 2 inches.

This beautiful little squirrel, which is thus far the smallest known, is called by the native tribes inhabiting the head waters of the Ovenga River "*Kendo*." It is always found on the trees of the forest, and to get a sight at it is most difficult, not only on account of its small size, but of its constant and rapid movements.

It is found on the mountainous range or table-lands situated in the interior from the western coast of Africa, between two degrees north and two degrees south of the equator. I did not meet it in the maritime plains situated between these mountains and the sea.

Mr. Du Chaillu also exhibited the skull of a manatee from Western Africa, called " Manga " by the natives of the Camma country. Thinking it to be a new species, he had proposed for it the name of *Manatus Oweni*, but it probably belongs to the *M. Vogelii*, (Owen,) from the rivers of Central Africa, if that be specifically different from *M. Senegalensis* (Cuv.). The molars are $\frac{9\cdot9}{9\cdot9}$, of which six are in use on each side of each jaw.

General color dark plumbeous. Skin smooth, on which is scattered all over the body single bristly straight hairs from half an inch to an inch long; eyes very small; paddles without nails. The largest seen by him measured 10 feet in total length; length of paddle from below, 14 inches; greatest width of the tail, 23 inches.

It is found in the Nazareth, Mexias, Fernand-Vaz, Npoulounay, Ogobai, Rembo, Niembai, and Ovenga rivers, and also in the Anengue Lake. It frequents places where the water is still, or where the current is not strong. It feeds on the leaves of some of the trees growing on the banks of these rivers, whose branches fall into the stream, or on the grass growing in the water. During the rainy season, when the amount of fresh water coming from the interior prevents in the rivers mentioned the water of the sea from mixing with that of the river, this manatee is often found but a few miles above the mouth of the river. During the dry season, the amount of fresh water from the interior being less, and the sea-water flowing with the tide up these rivers to a certain distance, the manatee ascends higher up, in order to be in fresh water. It is very fat, and the skin is very thick, by drying becoming black and granulated.

Dr. Bryant communicated the following notice of a visit to Green Island, some ten miles out at sea, off the mouth of Chester Bay, Nova Scotia, by the Rev. I. Ambrose, M. A., Halifax, in a letter to J. Matthew Jones, Esq.

On June 28, 1860, he landed on the north side of the island. Not a puffin or any other kind of bird was to be seen, save a large number of "steering" gulls and some "mackerel" gulls flying overhead, whilst the whole island under foot was perforated and undermined by the petrels. He says:

"I first took a tour all around the grassy edge of the cliffs to look for gulls' eggs. I got two dozen of the 'steering gulls'' eggs, and the men eight dozen. Tore up the turf with my hands, following the little galleries with my fingers, and soon secured four dozen and a half of petrels' eggs, and two of the parent birds as specimens. I could have obtained, I suppose, a thousand dozen of the eggs if I had wished, and every mother bird with them, as the poor little things crowd back into their holes, making not the slightest noise or resistance whilst they behold the roof rudely torn from their dwelling, and their eggs taken away. In no instance, except one, did I find more than one egg in a nest, and in that there were but two; and yet some of the birds were hatching, as some of the eggs contained the embryo with its head and body so far developed as to clearly identify the species. The smell of the birds is at first very offensive; indeed we perceived it at a distance of two miles from the island. This smell is not occasioned by any decayed fish or other extraneous matter, as the nests and surrounding turf are invariably very clean, the nest itself being lined at the bottom with a very little dry fine grass. The odor is peculiar to the bird and its egg, and is particularly perceptible in the dark brown oily fluid which, seemingly in self-defence, these birds eject from their bills.

"The sun was just rising when we landed on the island, and although we had seen several petrels flying about the boat in the night and at dawn of day on our passage, yet on the island not one was to be seen. All were underground, where at first you could hear their twittering, as if arranging about nests and accommodations; but soon after sunrise they became almost entirely silent, at least so far as the screaming of the gulls, which was always about the same, would allow you to judge. On taking a petrel out of its nest, it would not on being set down attempt to fly at first, but would endeavor to dig its way down into some of the broken holes. Most of the nests seemed to be old ones newly fitted up, and I found several such where the bird had brought quite a sprinkling of fresh dirt out to the surface. They seem to form their galleries not so much by carrying out the surplus dirt, however, as by pressing themselves through the soft turfy soil. A great many ants had made their nests among the galleries, but did not seem to incommode the birds; perhaps, indeed, they serve them for food at times.

"I saw no traces of mice or rats on the island, and but few insects, but a dead gull had been torn to pieces and eaten by something, so that only the head and bill were left. I found several dead *sheep*, but nothing seemed to have touched them. Probably *hawks* frequent the place.

"Green Island is about the size of 'George's Island' in Halifax harbor, and is almost round in shape, being, however, a little longer in its east and west diameter than in that running north and south. It is composed of a blue slate rock thickly barred with grayish veins, and covered with a light, brown, turfy soil. A good deal of grass grows on the place — hence its name. And there is a small pond of half stagnant rain-water on the top of it in a little valley, bordered with the wild flag. Not a tree or shrub grows on it. The only flowers I saw were the flag blossoms, white violets, and a small plant with a leaf like that of the wild rose and a blossom like the buttercup. The rock of which the island is composed is fireproof, and is the same as that at the 'Raggeds,' — some scattered islets and points lying about northwest from Green Island, and near Lunenburg.

"I had not time to examine the shore for shells as thoroughly as I wished, as the men were pressed for time; but I fear the sea soon smashes all that are washed ashore, as the beach is more than half composed of small fragments of shells. Large masses of stone are to be seen, which have evidently been split off by the frost, but the rock not being liable, like granite, to disintegrate by rain, retains its square shape."

The following is the full report on the subject referred to by Mr. Marcou at the preceding meeting: —

ON THE PRIMORDIAL FAUNA AND THE TACONIC SYSTEM, BY JOACHIM BARRANDE; WITH ADDITIONAL NOTES, BY JULES MARCOU.

The discovery of *Paradoxides Harlani* at Braintree, and that of *Paradoxides Bennetti* and *Conocephalites* at St. Mary's Bay, Newfoundland, in slates until then regarded as Azoic and placed among the crystalline and primary rocks, show plainly that the Primordial fauna is represented also on the Atlantic coast of North America. These are not isolated facts, but rather two landmarks showing the existence of strata occupying an important place in the system of stratified rocks.

In a letter dated Paris, 29th May, 1860, M. Barrande says: —

"If you see Prof. W. B. Rogers I beg you to thank him for his three beautiful photographs of *Paradoxides Harlani* (Green,) which he was so kind as to send me. They were very interesting to our Geological Society (of France) where I showed them, stating that this species is identical with *P. spinosus* of Bohemia. This is a very important fact, and should have a happy result, that of establishing the relative age of the most ancient formations on the two continents."

In his note "On the *Primordial Fauna*," (see "*Bul. de la Soc. Géol. de France*," vol. XVII. p. 551,) M. Barrande gives it as his opinion that the *P. Bennetti*, though differing from the *P. spinosus* of Bohemia, belongs to the same group of fossils.

This being established, let us proceed a little farther and see if previous discoveries and published records permit the extension of the Primordial fauna over some other portions of North America.

Prof. E. Emmons in his geological survey of Lake Champlain, as far back as 1838, recognized below the Potsdam sandstone a series of strata, which he described at length in 1844, and named the *Taconic System*. The fossils then found by Prof. Emmons were few in number and so badly preserved that some doubts may have been entertained at that time as to their determination and value as characteristic fossils. Nevertheless, his *Eliptocephalus asaphoides* was a Trilobite form so different from those known in the other strata of New York, that a skilful paleontologist would not have let it pass without further inquiry.

The principal argument of Prof. Emmons was based on stratigraphical and lithological grounds, and the numerous sections and descriptions of rocks accompanying his Taconic system are certainly conclusive, so far as geognostical characters are concerned. The paleontologist of the State of New York rejected the Taconic system, and, siding with other opponents of Prof. Emmons's discovery, in his first volume of the "Paleontology of New York," (1847,) Mr. James Hall assigns the age of the *Hudson River* group to the strata of the *Taconic system*, explaining the difference of lithological characters by metamorphisms, the discordance of stratification and the different thickness of the strata by folding and faults; the fossils he regards as badly determined. His opinions are not supported by detailed sections, but he refers to the *Introduction* of his work for explanation, which *Introduction* as yet remains unpublished.

Since 1844 Prof. Emmons has continued his observations and discoveries on those *bottom rocks*, and in 1855 he gave a more complete account of his Taconic system in the second part of his "American Geology." This book has unfortunately escaped M. Barrande's inquiries, for his attention would be strongly drawn to the new Taconic fossils it contains. It is evident from the new specimen of *Eliptocephalus asaphoides*, from the shales of Washington County, New York, figured Pl. I, fig. 18, that this trilobite is a *Paradoxides* related to the group of *P. spinosus*, perhaps identical with the *P. Harlani* of Braintree. Besides, the trilobite figured Pl. I, fig. 16, and called *Atops trilineatus*, is a true *Sao*, which genus is among the most characteristic of the Primordial fauna of Bohemia and Scandinavia. Prof. Emmons has thus found at least two trilobites of the Primordial fauna in slates forming part of his Taconic System. Trilobites are the most important fossils for the determination of the age of the oldest strata; the labors of M. M. Barrande and Angelin have shown with what certainty geologists can rely upon them. Other less significant fossils have been found by Emmons, such as *Graptolites*, *Lingulæ*, and *Oboli*. Sections and very detailed descriptions of strata show that the Taconic system, as defined by its discoverer, is composed of shales, slates, limestones, dolomites, conglomerates, sandstones, and iron breccia, whose combined thickness is between 25,000 and 30,000 feet, always resting on granite, gneiss, quartzite, and other crystalline rocks; that it lies at the base of the Silurian (such as the Silurian was first established in England and in America); and that this *bottom formation* extends, according to Emmons himself, from Newfoundland to Maine, Canada, Vermont, Massachusetts, Rhode Island, and along the Alleghanies to Georgia.

A discovery made some time since, but only published last year, has brought before the scientific world new forms of fossils, which, according to M. Barrande, unquestionably belong to the Primordial fauna. The following is the statement of M. Barrande, contained in a letter to Prof. Bronn of Heidelberg, to be published in the German Geological Journal: "*Neues Jahrbuch für Geologie und Petrefakten Kunde.*"

"*Paris, July* 16, 1860.

". . . . . I have recently received, thanks to the kindness of M. E. Billings, the learned paleontologist of the Geological Survey of Canada, a very interesting pamphlet entitled 'Twelfth Annual Report of the Regents of the University of the State of New York, 1859.' If you possess this publication, you will find there, at page 59, a memoir of Prof. J. Hall, entitled 'Trilobites of the Shales of the Hudson River Group.' This savant there describes three species under the names *Olenus Thompsoni*, *Olenus Vermontana*, and *Peltura* (*Olenus*) *holopyga*. The well-defined characters of these trilobites are described with the clearness and precision to be expected from so skilful and experienced a paleontologist as James Hall.

"Although the specimens are incomplete, their primordial nature cannot admit of the least doubt, when the descriptions are read, accompanied with wood engravings which the large dimensions of these three species render sufficiently exact. The first is 105 millim. long by 80 broad, the other two are somewhat smaller.

"The heads of the two *Oleni* being deteriorated, the furrows of the glabella cannot be recognized. The thorax has a common and remarkable character, which consists in the greater development of the third segment, the point of which is stronger and longer than in all the other pleura. This is a striking resemblance to the *Paradoxides*, the second segment of which has the same peculiarity. Besides, there is an intimate relation between these two primordial types, and we should not be surprised if America furnished us with forms uniting most of their characteristics. The pygidium of *O. Thompsoni*, the only one that is known, shows no segmentation, and attests by its exiguity its relation to a primordial trilobite. *P. holopyga*, by its whole appearance, resembles the species of Sweden so well known by the name of *P. Scarabœoides*.

"Thus all the characters of these three trilobites, as they are recognized and described by J. Hall, are those of the trilobites of the primordial fauna of Europe. This is so true, that I think I may say without fear, if M. Angelin, or any other paleontologist practised in distinguishing the trilobites of Scandinavia, had met with these three American forms in Sweden or Norway, he would not have hesitated to class them among the species of the Primordial fauna, and to place the schists enclosing them in one of the formations containing this fauna. Such is my profound conviction, and I think any one who has made a serious study of the trilobitic forms and of their vertical distribution in the oldest formations will be of the same opinion.

"Besides, all who have seriously studied paleontology know well that each geological epoch, or each fauna, has its proper and characteristic forms, which once extinct reappear no more. This is one of the great and beautiful results of your immense researches, which have generalized this law, recognized by each one of us within the limits of the strata he describes.

"The great American paleontologist arrived long since at the same conclusion, for in 1847 he wrote the following passage in the *Introduction* to the first volume of the Monumental Work consecrated to the Paleontology of New York.

"'Every step in this research tends to convince us that the succession of strata, when clearly shown, furnishes conclusive proofs of the existence of a regular sequence among the earlier organisms. We are more and more able, as we advance, to observe that the Author of nature, though always working upon the same plan and producing an infinite variety of forms almost incomprehensible to us, has never repeated the same forms in successive creations. The various organisms called into existence have performed their parts in the economy of creation, have lived their period and perished. This we find to be as true among the simple and less conspicuous forms of the paleozoic series, as in the more remarkable fauna of later periods.' — *J. Hall*, '*Pal. of New York*,' *I. p. XXIII*."

"When an eminent man expresses such ideas so eloquently, it is because they rise from his deepest convictions. It must then be conceived that J. Hall, restrained by the artificial combinations of stratigraphy previously adopted by him, has done violence to his paleontological doctrines, when, seeing before him the most characteristic forms of the *Primordial fauna*, and giving them names the most significant of this first creation, he thinks it his duty to teach us that these three trilobites belong to a horizon *superior* to that on which the second fauna is extinguished.

"In effect, according to the text of J. Hall, the three trilobites in question were found near the town of Georgia, Vermont, in schists which are superior to the *true Hudson River group*. In his works J. Hall does not go beyond indicating the horizon of certain fossils, and no one would think of asking a guaranty for such indications. But on this occasion the great American paleontologist thinks it necessary to support his stratigraphical determination by another authority, chosen from the most respectable names in geology. The following is the note which terminates his Memoir.

"'NOTE.— In addition to the evidence heretofore possessed regarding the position of the shales containing the Trilobites, I have the testimony of Sir W. E. Logan, that the shales of this locality are in the upper part of the Hudson River group, or forming a part of a series of strata which he is inclined to rank as a distinct group, above the Hudson River proper. It would be quite superfluous for me to add one word in support of the opinion of the most able stratigraphical geologist of the American continent.'

"Now, when a savant like J. Hall thinks himself obliged to invoke testimony to guarantee the exactness of the position of a few fossils, it is clear that the determination of this position is difficult.

"In order to understand these difficulties I have consulted the maps and documents relating to the State of Vermont and the country in which the town of Georgia is situated, and, although the library of our Geological Society does not contain all that one could wish on this subject, I recognized easily that Georgia is placed in the region where the order of succession of the deposits is the most obscured by foldings and dislocations; so that the position of the schists in question could not have been determined by the incontestable evidence of direct superposition. Besides, the physical appearance of these schists is not that of the rocks constituting the typical group of Hudson River. This is verified by the Note of J. Hall, for it tells us that Sir W. E. Logan is inclined to make a distinct group of these schists *superior* to that of the Hudson, and which consequently *would crown the whole Lower Silurian division* of the continent.

"For the above reasons, the geological horizon on which the three *Oleni* of Georgia were found appears to me to have been but uncertainly determined at first view, and even in complete opposition to paleontological documents.

"I do not think, then, that I weaken in the least degree the respect and confidence justly inspired by the labors of the American savants whose names have just been mentioned, when I ask them in the name of science to make new researches and new studies, that may lead to a final and certain solution of this important question.

"Doubtless, thanks to the progress of our knowledge, we are now no longer bound by the ancient conception of the simultaneous extinction and the total renovation of the faunæ. For myself, in particular, it would not be possible to accuse me of similar views at the moment when I publish the explanation of my doctrine of colonies. But you will perceive that the facts which I invoke in support of this doctrine are far from sustaining the reappearance of a fauna after the extinction of the following fauna, which the three trilobites of Georgia would do, if they had really lived after the deposit of the Hudson River group.

"This reappearance would be still more astonishing, as among the three great Silurian faunæ the second fauna occupies the greatest vertical space and is probably the one which enjoyed the longest existence. Thus, to verify such a reappearance, the most incontestable proofs are required, for such a decision would oblige the entire re-formation of one of our most important scientific creeds.

"Yours very truly,

"J. BARRANDE."

Prof. Emmons has always regarded these black slates of Georgia as part of his Taconic system, and more, he refers them to the base of the upper division of the Taconic rocks (see "*American Geology*," part II. p. 49). The strata are dislocated and upheaved at Georgia, and as far as my knowledge of the geology of the vicinity of Burlington, Isle La Motte, Chazy, and Rouse's Point extends, acquired in an exploration of a few days in 1849, I am far from agreeing with the statement made by Messrs. Logan and Hall that the strata of Georgia are of the age of the Hudson River group. Mr. Emmons, I think, rightly refers them to the Taconic system, and the discovery of the three primordial trilobites confirms the view arrived at by him only through their stratigraphical and lithological characters.

In another letter, dated Paris, 14th August, 1860, M. Barrande says: —

"You will easily perceive the interest and importance of the question, even if it were only raised on account of the three *Oleni* of Georgia; but it takes in now a much wider field, owing to a letter I have just received from Mr. Billings, official paleontologist of the Geological Survey of Canada, who informs me that he has found lately, in the schists and limestones near Quebec, considered as being the prolongation of those in question in Vermont, nearly one hundred species, almost all new. Twenty-six of these come from a white limestone, and seem to him to be the true representatives of the Primordial fauna, and he cites among them *Conocephalites*, *Arionellus*, *Dikellocephalus*, etc., that is, very characteristic forms of this fauna.

"In another limestone, which is gray, he finds thirty-nine species, all different from the first, and representing, on the contrary, the most distinct types of the second fauna. Finally, the black schists furnish him with *Graptolites*, *Lingulæ*, etc., etc., fossils which at first sight cannot determine a horizon, because they are found upon several Silurian horizons.

"While waiting for the very obscure stratigraphical relations to be disentangled, and without engaging in any manner Mr. Billings, who should preserve the independence of his opinion, I may yet express to you my view wholly personal, and of which at this moment I take the entire responsibility. I think, then, that this region of schists and limestones of Vermont, in other words the *Taconic system*, will reproduce in America that which took place in England as to the Malvern Hills, and in Spain for the Cantabrian chain, — that is to say, the Primordial fauna, after having been disregarded, will regain its rights and its place, usurped by the second fauna.

"You see it is a great and noble question, whose final solution will complete the imposing harmonies existing already between the series of paleozoic faunæ of America and that of the contemporaneous faunæ of Europe, leaving to each the imprint peculiar to its continent.

"I can well imagine, from the position previously taken by our learned American brothers on the subject of the Taconic system, that the final solution of which I speak will not be obtained without debate, and perhaps some wounding of self-love, for some opinions that appear to be dominant must be abandoned.

"But experience has taught me that in such cases the most elevated minds turn always first to the light, and put themselves at the head of the movement of reform. Thus, when in 1850 I recognized the Primordial fauna in the Malvern Hills, where the second fauna only had been found, Sir Henry de la Beche and Sir Roderick Murchison were the first to adopt my views, to which little by little the other official geologists agreed; Ed. Forbes ranged himself publicly on my side in 1853 in 'The Geological Survey,' while others still hesitated, and now there is no longer any opponent.

"I think it will be nearly the same in America, and that in some years from now the opinions of your savans will have undergone a great change as regards this question.

"It is a fine opportunity for Dr. Emmons to reproduce his former observations and ideas with more success than in 1844.

"Yours very truly,

"J. BARRANDE."

I would add to the above letter a few words on the geology of the vicinity of Quebec. Twelve years ago I passed a few days in that region, and my opinion, formed from my own observations made at that time, differs wholly from the publications of Mr. Logan and Dr. Bigsby on the subject. Dr. Bigsby (*On the Geology of Quebec and its environs*, "*Quart. Journ. of the Geol. Soc. of London*," vol. IX. p. 82, 1853,) refers all the strata, except a narrow band of limestone north of Quebec, to the Hudson River group; the limestone band extending from Montmorency to Indian Lorette is determined by him as Trenton limestone. The fossils upon which he relies for placing the Quebec strata in the Hudson River group are only a few *Graptolites*. Dr. Bigsby admits that the Hudson River group is enormously developed in that part of North America, that it is composed of rocks almost azoic, and that he does not understand clearly how what he calls the Hudson River group came to be conformable to the gneiss, with two unconformable and widely different strata of great thickness interposed. Mr. Logan is of the same opinion as Dr. Bigsby on the age of the strata in the vicinity of Quebec, and moreover he gives an explanation of what puzzled the Dr. so much. In his "*Report of Progress for the year* 1852-3," p. 35 and 36, Mr. Logan explains the discordance of stratification between the Trenton limestone and the Quebec bituminous black and gray slates, by an *anticlinal axis* complicated by a *fault*. It must be observed that Mr. Logan admits that he cannot give any precise facts by which to determine the position of the anticlinal. I quote his description of the Montmorency Falls section.

"The details of the fault are well displayed at Montmorency Falls; here the channel of the river is cut down through the black limestone beds of the Trenton formation to the gneiss of the anticlinal ridge, and the water at and below the bridge flows down and across the gneiss, and leaps at one bound to the foot of a precipice, which, immediately behind the water, is composed wholly of this rock. At the summit of the cascade, the Trenton beds on each side have a thickness of almost fifty feet, and they are marked by *Trinucleus concentricus*, *Calymene senaria*, *Conularia quadrisulcata*, *Leptæna sericæa*, *L. deltoidea*, *Orthis testudinaria*, and *Lingula*. The dip of these beds is down the stream at a very small angle; but at the foot of the precipice, and in immediate contact with the gneiss, about the same thickness of limestone is tilted up to an angle of fifty-seven degrees; it is followed by a similar amount of black bituminous shale with the same slope; in this attitude these rocks climb up the face of the precipice, presenting their edges to the chasm on each side. They are followed by about eight feet of strong hard gray sandstone, weathering brown, in beds of ten to eighteen inches, interstratified with black shales, to which again succeed gray arenaceous-argillaceous shales, composing the sides of the chasm, out to the waters of the St. Lawrence. The limestones belong to the Trenton, the black shales to the Utica formation, and the gray to the Loraine shales."

When at Montmorency Falls, 28th Sept. 1849, I made the following notes. The fall is formed by a quartzite rock passing to mica-schist (gneiss of Messrs. Logan and Bigsby) with traces of substratification, and running east 20° north, to west 20° south; at the foot of the fall and in contact with the quartzite there is a series of black bituminous slates, with intercalations now and then, more especially near the base of the fall, of small beds of limestone. This system of slate is strongly upheaved, the beds dipping east east south at an angle of 60°, and near the foot of the fall they are almost vertical. They form a sort of amphitheatre around the falls and are prolonged toward the St. Lawrence River, disappearing beneath the water and reappearing at the Isle of Orleans. I find no fossils in this system. The upper part of the fall is formed by a series of blue limestone 40 or 50 feet in thickness, almost horizontal near the bridge, but inclined from 10° to 15° east east south, on the left side of the fall near the chasm. This limestone, which is a little marly, rests directly on the quartzite rocks; it contains immense numbers of ramose corals, which were submitted in 1850 to Milne Edwards and Jules Haime, and were identified by those learned paleontologists with the *Alveolites repens* (Fougt.) of the Upper Silurian of Dudley and Wenlock in England and of Gothland in the Baltic, and nearly related to, if not identical with, a ramose coral of the Niagara group at Lockport. The *Alveolites repens* was the only fossil found by me at Montmorency, and was noted with the suggestion that the limestone belongs to the Trenton or perhaps the Niagara group. The quartzite and mica-schist *have upheaved the bituminous black slates*, and the *almost horizontal strata of limestone have been deposited after the dislocation.* This description of Montmorency Falls differs widely from the description published by Mr. Logan, and, now that the question of the Primordial fauna and the Taconic system is brought forward, I have no doubt that those black slates at the foot of Montmorency Falls, the strata of the Isle d'Orleans, the city of Quebec, the Plains of Abraham, Point Levi, all the south shore of the St. Lawrence going up the Chaudière River as far at least as the Chaudière Falls, which are all strongly elevated, dislocated, and follow the general direction east 20° north to west 20° south, belong to the Taconic system of Vermont and Eastern New York, and that in this system the fossils belonging to the Primordial fauna have been found. I did not see the anticlinal axis with fault, described by Mr. Logan, and I explain the relations of the rocks by a *discordance* of stratification, caused by upheaval anterior to the deposit of the Montmorency Bridge limestone. At Indian Lorette the section is almost identical with that of the Montmorency Falls. In the direction of Beauport I picked up in some limestone quarries several brachiopoda which resemble Trenton brachiopoda, but they were never determined in a regular way. They are now in the collection of the *Jardin des Plantes* at Paris, with my other gatherings in North America during the years 1848, '49, and '50.

Mr. Salter, who has examined the fossils picked up by Dr. Bigsby at Montmorency, Beauport, and Indian Lorette, regards them as indicating the Trenton limestone, and Mr. Logan gives a list of fossils indicating for the limestone at the summit of the cascade the Trenton age. In accordance with these two geologists, I regard those horizontal beds of limestone as representing the Trenton limestone of New York, although I think the presence of the *Alveolites repens*, an Upper Silurian coral, in those rocks, requires further inquiry before arriving at a final conclusion on all the rocks found at Montmorency.

The fifty feet of limestone pointed out by Mr. Logan at the foot of the fall, and in immediate contact with the gneiss, I did not see, and it is difficult for me to believe that fifty feet of limestone could have escaped my notice when my attention was entirely fixed on the stratigraphical phenomena of the section of Montmorency Falls. But it is such a celebrated place for excursions and of such easy access, that the verification of the question by a geologist can readily be made. Even if these fifty feet of limestone are there, it is to be proved that they contain Trenton fossils, which Mr. Logan does not say.

Messrs. Logan and Hunt, in previous works, ("*Report of Progress of the Geological Survey of Canada, for the year* 1847–48," and, "*Esquisse Géologique du Canada, avec une Carte Géologique du Canada*," Paris, 1855,) have described and colored all the country east of Montreal, between Lake Champlain and Quebec, as occupied *exclusively* by strata of the age of the *Hudson River group* and *Oneida sandstone*, or *Richelieu slates* and *Sillery formation*, with some patches of *Trenton limestone*. It is certain that the *Taconic system* occupies the *main part* of the country, and that the geological map of Lower Canada is to be greatly modified to be put in harmony with the Primordial fauna formation.

I have been informed lately that Messrs. Logan, Hunt, and Hall maintain the age of the Hudson River group for the strata of Quebec and Georgia on stratigraphical grounds, which to Mr. Logan are very clear; and that they are disposed to think the so-called Primordial fauna extends much higher in Canada than in Europe, and has *reappeared after a first extinction.* Such a decision should not be reached without the most decisive proofs, for it breaks through the laws of paleontology, and annihilates almost all the results arrived at by the labors of Smith, Cuvier, Brongniart, De Buch, D'Orbigny, Agassiz, Barrande, etc., for the last fifty years. Nor is this the first attempt of geologists recognizing Mr. James Hall as their leader against the recognized laws of paleontology. During the last six years they have placed an Oligocene flora *below* the cretaceous rocks, a Triassic flora *among* what they call Jurassic rocks, Jurassic fossils *in* cretaceous rocks, the mountain limestone fauna *above* the coal-measures, cretaceous fossils *in* Triassic rocks, etc. etc.

There is at least one proof that Messrs. Hall, Logan, and Hunt can give, to show that the Primordial fauna extends over the second fauna, — it is to show, in those parts of New York where the strata are without dislocation and succeed regularly, such as Utica, Loraine, Pulaski, and the neighborhood of Rome, that the Primordial fauna is *above the second fauna.*

There is only one point on which I differ from Prof. Emmons, — it is as to the propriety of placing the Potsdam sandstone as the *base* of the Silurian. Until now not a single fossil of the Calciferous sandrocks, of the Black River group, or of the Trenton group, has been found in the Potsdam of the State of New York; on the contrary, it contains the Primordial fauna, such as *Conocephalites*, *Dikellocephalus*, *Orthis*, and *Lingula.* Thus, the Potsdam group is paleontologically entirely independent of the Lower Silurian, while it possesses fossils belonging to the Taconic system. I am not sufficiently acquainted with its distribution and position as regards the Taconic and the Calciferous sandrocks to give a decided opinion based on stratigraphical grounds, but from the description of Prof. Emmons in his *Taconic system*, and from what I have seen at Little Falls, the Calciferous sandrocks are certainly very differently distributed from the Potsdam, and a dislocation and disturbance of strata have taken place between the two groups. Instead of regarding the Potsdam as the *first* term of the Silurian rocks, I think it is the *last* one of the Taconic system, which changes its place of *bottom rocks* containing fossil remains into that of *cover*, capping a system of 30,000 feet of fossiliferous strata, containing at different levels, especially the upper half, the remains of organic beings left by the Primordial fauna.

The Taconic system, contrary to the other members of the Paleozoic series of North America, has been subjected to dislocations on a vast scale, and presents almost always strata upheaved, broken up, and in the most disturbed state, with the exception of the upper portion or Potsdam group. Generally, along the Alleghany range, the Lower Silurian rocks follow immediately; although in Canada, Vermont, and New York, patches of Hudson River group, Utica slate, Trenton limestone, Chazy limestone, and Calciferous sandrocks, indicate that the Lower Silurian strata have recovered in discordance of stratification some parts of the country where the Taconic strata were upheaved and dislocated. In Pennsylvania, Virginia, and North Carolina, New Red Sandstone covers the Taconic strata, probably, also, in Maine and New Brunswick. In the elevation of land comprised between the Upper Mississippi, Lake Superior, and Lake Michigan, the Taconic system is well developed, resting on granite; it is formed of slates, mica-schists, quartzites, limestones, iron breccia, and is terminated by what D. D. Owen has called *Lower sandstone of the Upper Mississippi*, or *formation I.* Until now, fossil remains have only been found in the upper part of the system, on the St. Croix River, where Mr. Owen has indicated and described Trilobites and Lingulæ, indicating the Primordial fauna. Fragments of Primordial Trilobites, and Lingulæ, have also been found near Lake Michigan, and on the Menomonee and Escanaba rivers. On the southern part of the elevation of land alluded to, the Taconic strata are followed and recovered by the Silurian rocks, while on the northern part, that is to say, in the Lake Superior direction, they are covered in *discordant stratification*, as in North Carolina, by the *Triassic strata* of the Lake Superior sandstone formation. Taconic strata exist also on the northern shore of Lake Superior, especially near the Pic and

Gros Cap, where slates are found intercalated between granite and gneiss rocks.

Farther west, in the Black Hills of Nebraska, Dr. Hayden has recognized the Primordial fauna in a series of sandstone rocks, resting on slates, mica-schists, and azoic rocks. Dr. Ferdinand Roemer, in his exploration of Texas ("*Die Kreidebildungen von Texas und ihre organischen Einschlüsse*" Bonn, 1852), has described trilobites from the San Sabaz, which M. Barrande refers to the Primordial fauna; and Dr. B. F. Shumard has since discovered in the same region of Texas, trilobites of the genus *Arionellus, Lingulæ, Obolus,* and *Orthis,* which leave no doubt of the existence of the Taconic system in Texas ("*Trans. of the Acad. of St. Louis,*" p. 673, 1860). Even from the small notice of Dr. Shumard, it appears that the Primordial fauna of Texas is almost identical with the one just discovered in the Cantabrian Chain of Spain by Casiano de Prado, ("*Bull. de la Soc. Géol. de France,*" p. 516, vol. XVII., 1860).

Dr. A. A. Gould presented the following descriptions of new shells collected by the North Pacific Exploring Expedition:—

Mangelia semiassa. T. rhomboideo-fusiformis, crassa, nitida, albida anticè livida, 8-plicata et striis exilissimis volventibus insculpta; anfr. 6 angulatis; suturâ impressâ: apertura $\frac{1}{2}$ totius longitudinis, pyriformis, anticè acuminata; labro simplici incrassato; sinu vix notato; columellâ rectâ, lividâ. Axis 8; diam. 3 millim. Inhabits —— ?

Mangelia tetragona. T. acicularis, turrita, quadrangularis, (angulis compressis), lactea, striis subtilissimis confertis transversis insculpta; anfr. 6 pyramidatis, apicali mamillato: apertura $\frac{1}{3}$ totius longitudinis, satis ampla; labro incrassato posticè angulato. Axis 6; diam. 2 millim. Inhabits China Seas. W. S.

Mangelia concinna. T. tenuis, elongato-ovata, turrita, nitida, striis exilissimis transversis insculpta, straminea maculis quadratis ferrugineis juxtà suturam, deinde vittâ angustâ albâ, denique fasciis et lineis rufescentibus picta; anfr. 8 posticè declivibus, supernis strigatis: apertura $\frac{1}{2}$ totius longitudinis, angusta;

labro tenui; sinu ferè desiderato; columellâ rotundatâ, politâ; canali lato brevissimo. Axis 10; diam. 4 millim. Inhabits Loo Choo. W. S.

Olivella spreta. T. parvula, elongato-ovata, livida, strigis flexuosis longitudinalibus flavidis picta: spira admodum elevata; anfr. 4; suturâ canaliculatâ: apertura $\frac{2}{3}$ totius longitudinis citò dilatata; columellâ plicis eminentibus bifidis rufis munitâ. Axis 6; diam. 3 millim. Inhabits Hong Kong Harbor, in 10 fathoms, shelly sand. W. S.

Most like *O. mutica*, but the pillar lip differs.

Genus Æsopus. Animal albidum; soleâ anticè emarginatâ, posticè obtusâ operculum corneum flabelliforme gerente; capite parvo; vibraculis curtis obtusis; oculis externis medianis; siphone lato, brevissimo. Testa fusiformis, gibbosa, anticè latè truncata; aperturâ lunatâ, angulo postico callo impleto; columellâ simplici vitreo indutâ; suturâ propè aperturam abnormaliter arcuatâ.

The curious curve of the suture near the posterior angle of the aperture, as if it had been drawn backward, thereby pulling back this angle and curving the last whorl downward, is very peculiar. The form and aspect of the shell, and the structure of the animal, indicate its place to be intermediate between *Mitra* and *Columbella.*

Æ. japonicus. T. parva, solidula, castanea, prope suturam pallescens, striis volventibus incisa; anfr. 7 tumidulis, posticis plicatulis, ultimo ovali, latè truncato, $\frac{3}{5}$ totius long. testæ adequante: apertura lunata; peritremate reflexo; columellâ laminâ vitreâ latâ suberectâ indutâ. Axis 7; diam. 2 millim. Inhabits Kagosima Bay, at 5 fathoms, sandy bottom. W. S.

The only species as yet found, but quite peculiar enough to distinguish it from all other shells.

This very distinct genus, both as to shell and animal, plainly belongs to the family *Amphiperasidæ*, having the form and lip of *Ovula*, while the base is traversed by sharp transverse ridges, as in *Cypræa*, passing over the pillar into the aperture. The broad and short tentacles, the position of the eyes, and the long, obtuse foot of the animal, are quite peculiar.

Genus CRITHE. Animalis discus elongatus, anticè truncatus, angulis vix productis, posticè obtusus; collum dimidiam latitudinis disci, anticè bifurcatum; tentaculis brevibus triangularibus, oculis minutis externis, basalibus. Testa porcellana, convoluta, utrinque rostrata: apertura angusta, arcuata; labro simplici; ventre laminis transversis acutis totus arato.

CRITHE ATOMARIA. T. minutissima, lactea, ovularis, levigata: apertura coarctata, laminis ventralibus ad octo. Axis 0.5; diam. 0.3 millim. Inhabits the China Seas. W. S.

Shell very minute, milk-white, glossy, ovate, somewhat acute at extremities, most so at summit, where there is a delicate groove; aperture very narrow and uniformly so; rostrum short, slightly recurved; ventral laminæ directly transverse, about eight in number, and, as the pass into the aperture, giving the appearance of coarse denticles on the pillar.

This peculiar little shell is the only one of the genus yet observed. The animal is citron-colored, the viscera slate-colored, the eyes reddish black, very small.

PERSICULA TANTILLA. T. minuta, oliviformis, candida, polita: spira occulta: apertura linearis anticè vix dilatata; labro apicem paullo superante, simplici acuto; columellâ plicis obliquis acutis 5 munitâ. Axis 3; lat. 1.5 millim. Inhabits China Seas. W. S.

It has the form of *P. imbricata.*

MARGINELLA (Glabella) LEPIDA. T. minuta, ovato-trigona, tenuis, polita, lactea: spira elevata lateribus concavis; anfr. 3: apertura angusta; sinu posticè parvo; labro incrassato concinnè crenulato; columellà denticulis acutis 4, postico minimo, et plicâ siphonem circumambiente instructâ. Axis 3; diam. 2 millim. Inhabits China Seas. W. S.

Allied to *M. lævis.*

MARGINELLA SEMINULA. T. minuta, ovoidea, polita, tenuis, lactea: spira obtusa, vitro coöperta: apertura antrorsum dilatata, posticè rotundata; labro simplici posticè subsinuato et in plicam posticam columellæ desinente; plicis 4 perobliquis; columellâ nudâ. Axis 4; diam. 3 millim. From a Gorgonia in False Bay, Cape of Good Hope. W. S.

Foot of the animal twice as long as the shell, truncate in front, dilated at sides, lanceolate and carinate posteriorly; mantle not enveloping the shell; tentacles long subulate; eyes lateral near the base of vibracula. The shell belongs to the section *Prunum* of Martini.

VOLVARINA PUELLA. T. parva, ovato-cylindracea, subflexuosa, polita, ex eburneo flavescens: spira depresso-conica; anfr. 4, ultimo elongato-ovato; suturâ vitreâ: apertura antrorsum dilatata; labro tenui, inflecto, posticè callo modico suffulto; columellâ 4-plicatâ. Axis 12; diam. 6 millim. Inhabits Simon's Bay, in 18 fathoms, gravelly bottom. W. S.

Resembles *V. zonata*, but is much larger; possibly the shell given by Sowerby as a variety, though no traces of bands are visible. Like *V. tæniata* in form and size, but with a different lip. The animal is very active, of a pale lemon-color, with blotches of flake-white and very numerous crimson points; margin of mantle dark chocolate. Generally like the animal of *Persicula.*

AMPHIPERAS BULLATUS. T. tenuis, ovato-globosa, rubicundula, lineis incrementi et posticè striis volventibus insculpta: apertura linearis; labro angusto vix crenulato, porcellano, utroque pariter producto, posticè canalem contortam obliquam callo circumdatam efformante, anticè unà cum plicâ columellari canalem brevem angustam definiente.

Closely resembles *A. umbilicatus* and *margarita*, but wants the perforation and triply dentate callus of the former, and is much less acuminated, with a less distinct canal and a denser and more crenulated lip, than the latter.

PLANAXIS INEPTA. T. minuta, glabra, ovato-lanceolata, albido-lutescens, apice, lineâ subsuturali, et lineis alteris minoribus nigris, posticè et ad basin sulcis cincta; anfr. 8–10 convexis: apertura angusta; labro simplici, tessellato; columellâ modicè excavatâ; callo postico copioso. Axis 4; diam. 2.5 millim. Inhabits Kikaia Bay, at low-water mark. W. S.

Allied to *P. succincta.*

PLANAXIS CINGULATA. T. parva, crassa, ovato-turrita, glabra, fusco-rufa flavido alternatim zonata, striâ intercurrente; anfr. 7 convexiusculis, apicalibus granulosis, ultimo magno: apertura angustè ovata; labro obliquo intus 7 denticulato et fasciato; columellâ excavatâ, rufâ. Axis 12; diam. 6 millim. Inhabits Ousima, under stones, at low-water mark. W. S.

TURRITELLA GRACILLIMA. T. parva, gracillima, acicularis, tenuis, dilutè fulva, fasciâ pallidâ cincta; anfr. 18–20 convexiusculis, filis volventibus tribus et antrorsum nonnullis minoribus sculptis; basi convexo, nitido: apertura circularis. Axis 20; diam. 4 millim. Inhabits Kagosima Bay. Very common. W. S.

One of the most delicate of species, looking like a young shell; but the number of specimens and of the whorls would indicate this as the usual aspect of the shell.

CERITHIUM LACERTINUM. T. turrita, fusiformis, tenuis, cinerea fusco maculata; anfr. 10 convexiusculis benè discretis, posticis plicatis et filis granulosis 4 ad anfractum ultimum demum simplicibus cinctis, minoribus plerumque intervenientibus: apertura semilunaris; labro acuto; rostro abbreviato. Axis 13; diam. 4 millim. Inhabits Sydney Harbor. W. S.

Exceedingly like *C. lima*, Brug. It has no varices however, is less slender, and differently colored. It is also like *C. granarium*, Kiener.

CERITHIUM STIGMOSUM. T. elongato-conica, albida, granulata, granulis fuscescentibus in seriebus tribus dispositis quorum medianâ ad anfractus anticos bipartitâ; anfr. 8+ convexiusculis, ultimo varicoso: apertura rotundato-ovata; columellâ arcuatâ, callosâ; rostro brevissimo, obliquo. Axis 7; diam. 2+ millim. Inhabits Bonin Is. W. S.

A minute species with the characters of *C. lacteum* and *C. papillosum*.

CERITHIUM PLACIDUM. T. minuta, elongata, acutè conica, lactea (apice rufo), crassa; anfr. 11 convexiusculis, filis 5–6 cinctis, posticis plicatis etiam granulatis; suturâ impressâ: apertura $\frac{1}{6}$ totius longitudinis, rotundato-ovata; rostro brevissimo. Axis 8; diam. 2 millim. Inhabits China Seas. W. S.

Another small species of the same group.

Bittium craticulatum. T. parva, subulata, fusca, plicis circ. 20 et liris acutis volventibus majoribus 4 supereuntibus alveolata; anfr. 10 ad modum convexis, ultimo varice munito et plicis anticè privato: apertura parva, rhomboideo-ovata, $\frac{1}{4}$ totius longitudinis æquans; rostro brevissimo. Axis 6; diam. 2 millim. Inhabits Hong Kong; laminarian zone. W. S.

Similar to *B. glareosum*, but less slender, the aperture smaller, and the sculpture not beaded.

Bittium glareosum. T. conica, elevata, turrita, leviuscula, dilutè rufa; anfr. 10+ planulatis, filis granulosis 4 cinctis et longitudinaliter ad 20-plicatis, ultimo varicoso et anticè constricto: apertura ovato-rotundata, posticè acuta; labro simplici; columellâ latè arcuatâ. Axis 6; lat. 2 millim. Inhabits Port Lloyd, Bonin Is., and Loo Choo Is. W. S.

Bittium parcum. T. parva, ovato-turrita, cinerea ad apicem vitrea, undulis ad 10 anticè evanescentibus et filis 6 (ad anfr. ult. 10+), filo minori plerumque interposito, ornata; anfr. 7+ rotundatis, duobus anticis nonconformibus: apertura rotundato-ovata, $\frac{1}{3}$ totius longitudinis æquans; labro vix incrassato; columellâ callo copioso indutâ. Axis 5; diam. 2 millim. Inhabits Loo Choo Is. W. S.

Bittium alutaceum. T. parva, elongato-ovata, acuminata, fusca; anfr. 8+ planulatis benè discretis, singulis gemmularum seriebus tribus hic nigris illic corneis instructis, ad anfr. ultimum in liras articulatas (filo interjecto) mutatis: apertura subcircularis; canali brevissimo. Axis 7; diam. 3 millim. Inhabits China Seas. W. S.

Much in the style of *C. granarium*, but much smaller. The granules are very distinct and well rounded, being separated by longitudinal furrows.

Cerithiopsis laqueata. T. elongato-conica, rufa; anfr. 13+ planatis eleganter bicarinatis; carinis acutissimis, remotis, posticâ majore, alterâ ad peripheriam, quintâ anteriori; interstitiis latis tenuè clathratis; basi planatâ radiatim striolatâ: apertura quadrata; labro a carinis 5-crenato. Axis 8; diam. 2 millim. Inhabits China Seas. W. S.

Most nearly related to *C. assimilata*, C. B. Ad., but its form is more tapering and its posterior keel larger.

Cerithiopsis aurantiaca. T. minuta, ovata, flavido-aurantia; anfr. nucleosis lineis spiralibus et radiantibus decussatis; anf. normalibus 5 planatis carinatis; carinis quoad spiram duabus validis obtusis haud remotis; alterâ infra peripheriam; alterâ denique circa basin; laminis longitudinalibus circ. 16 carinas decussantibus, tuberculosis; suturâ inconspicuâ: apertura? (fracta). Axis 2; diam. 1+ millim. Inhabits China Seas. W. S.

Resembles *C. pupiformis* from Mazatlan, but differs in the details of sculpture.

Cerithiopsis semipicta. T. minuta, crassa, ovata, albida, bizonata; anfr. 7 bicarinatis, carinis obtusis, tuberculatis, quarum posterior albida, anterior balaustina sunt; tuberculis circ. 16 validis elongatis; carinâ ante peripheriam, alterâ denique ad basin: apertura quadrata? (fracta). Axis 2.5; diam. 1 millim. Inhabits China Seas. W. S.

Resembles *C. sorex* from Mazatlan, except in sculpture.

Cerithiopsis rugosa. T. turrito-conica, rudis, cinerea; anfr. 12+ carinâ medianâ et alterâ anticali cinctis, interspatio concavo et laminis ad carinas dilatatis clathrato; intervallo postico convexo obversè clathrato; basi lineis incrementalibus solum insculpto; suturâ inconspicuâ: apertura subquadrata; rostro abbreviato; columellâ contortâ. Axis 15 diam. 4 millim. Inhabits China Seas. W. S.

Allied in form and size to *C. terebellum*, *C. metula*, and *C. punctatum*, but very differently sculptured.

Triforis intercalaris. T. alba, subulata; anfr. nucleosis 5, primo lævi ceteris unicarinatis; normalibus 16 planatis, carinis in spirâ cinctis, primum duabus remotis rotundatis, dein alterâ minori intermediâ sensim crescente donec alteris æquante; ad peripheriam denique quartâ; clathris ad 20 carinas decussantibus, intersectionibus tuberculosis; carinis duabus circa basin et canalem parum tuberculosis: apertura parum expansa; canalibus apertis, brevibus. Axis 6; diam. 1.5 millim. Inhabits China Seas. W. S.

Triforis interfilatus. T. conico-cylindrica, dilutè rufo-fusca; anfr. 10+ bicarinatis; carinis acutis, tertiâ ad suturam; inter carinas leves, totâ superficie clathratâ, clathris radiantibus circ. 30 rotundatis, interstitiis angustis; super clathras, inter carinas spirales, filo parvo spirali; circa basin carinis duabus rotundatis haud clathratis; basi radiatim rugoso: apertura expansa, suborbicularis; labro a carinis 4 et aliis intercalantibus eleganter undato; canalibus apertis, antico elongato, tortuoso, postico brevi, satis profundo. Axis .3; diam. .06+ poll. Inhabits Hong Kong Harbor. W. S.

Resembles *T. corrugatus*, Hinds, but the canal and basal sculpture are different.

Triforis calculiferus. T. conico-turrita, albida, sub-cylindracea; anfr. 12 planulatis, seriebus duabus quasi calculorum tertiâ quoque minore terminali ornatis, interstitiis spiraliter striulatis; carinâ in basi haud tuberculatâ; suturâ inconspicuâ: apertura (fracta)? canalibus clausis, antico tortuoso, postico parvo. Axis 6; diam. 2 millim. Inhabits Loo Choo. W. S.

Triforis clathratus. T. dilatato-subulata, alba; anfr. 9 convexiusculis, carinis spiralibus cinctis, in spirâ 3 (posticâ minore), ad peripheriam quartâ, circa basin duabus minoribus, a clathris circ. 16 decussatis, juncturis gemmatis; suturâ distinctâ: apertura (fracta)? canalibus brevibus, apertis. Axis 4; diam. 1.5 millim. Inhabits China Seas. W. S.

Prof. William B. Rogers presented to the Society, in the name of Mr. Norman Easton, of Fall River, a mass of silicious slate containing the imprints of shells, and gave an account of the discovery of these fossils in some of the pebbles of the conglomerate of that region.

He stated that, some two or three years ago, Mr. Easton had found a fossiliferous pebble on the beach at Fall River, which he at first naturally regarded as a mere fragment of ballast and of no geological importance; but, finding afterward other specimens of like character, not only on the shore but inland at a high level, he concluded that they must have been derived from some of the rocky masses of the neighborhood, and resolved to trace them to their source.

On the river bank, and elsewhere in this vicinity, are many loose boulders, some of them of large dimensions, composed of a very coarse conglomerate similar in aspect to the solid ledges which have their outcrop in Somerset, Dighton, and other tracts toward the North. Sagaciously pursuing the inquiry, Mr. Easton recognized the identity in lithological characters of the fossiliferous fragments with many of the pebbles included in these conglomerate boulders, and at length succeeded in detecting the fossils themselves in some of these imbedded pebbles.

In a visit to the neighborhood early in the summer, Prof. Rogers, in company with Mr. Easton and Mr. Shove, collected specimens from the loose stone heaps and boulders at Fall River, and, on a brief examination of the ledges of conglomerate in Dighton, found similar fossiliferous pebbles in the massive rock in place at that locality.

The fossil forms distinctly recognized in these specimens are *Lingulæ* of probably two species, resembling *L. prima* and *L. antiqua* of the Potsdam (Primal white) sandstone more nearly than any others with which they have thus far been compared. More perfect specimens and a wider comparison may, however, be necessary to give entire certainty to their determination.

This discovery is obviously but a first, though a most encouraging, step in our inquiries. The question is at once suggested, Where are we to look for the parent rock from which these pebbles were derived? And to answer this it will be necessary to make a thorough examination of the sedimentary masses of adjacent and perhaps somewhat remote regions, of which unfortunately so large a part is concealed by the covering of drift.

The coal measures of Rhode Island and the contiguous parts of Massachusetts have afforded a sufficient number of well-determined fossils to leave no doubt in the minds of geologists as to their general correspondence in period with the great Carboniferous system of this and other countries. But in regard to the age of most of the other rocky masses of Rhode Island and eastern Massachusetts we are yet without the means of forming any definite conclusion. The locality in Braintree in the latter region, signalized by the occurrence of that superb fossil *Paradoxides spinosus* (*Harlani*), presents us with a specimen of one of the earliest paleozoic formations, but between this and the coal we have as yet been unable to intercalate any one of the vast succession of formations which in the full geological series occupies a place between them.

The original rock from which the lingula-pebbles were derived, whether it shall be brought to light in the neighborhood or may have been buried seaward by an ancient submergence, will most probably connect itself closely in time with the period of the Braintree fossil. But we may hope that further research, aided by the local observation of such zealous inquirers as Mr. Easton, will enable us to supply for this region many other missing records of the paleozoic ages.

As regards the age of the conglomerate rock above referred to, Prof. Rogers remarked that, while it was undoubtedly a part of the Carboniferous series, he did not think that its position in the group had as yet been satisfactorily determined. In some localities it was seen overlying sandstones referable to this series, and could not therefore be regarded as the general floor-rock of these deposits, although probably occupying a low position among them.

Prof. Rogers also made the following communication on the causes which gave rise to the generally elongated form and parallel arrangement of the pebbles.

Referring to the characters of the conglomerate as presented at Purgatory and other places in the vicinity of Newport, and indeed generally throughout its outcrop, he commented on the hypothesis by which it has lately been proposed to explain the elongated form and parallel arrangement of the pebbles in the massive strata of the rock. He described the steep and alternating dips of these thick beds of conglomerate at and near Purgatory, as made apparent by the occasional layers of interposed sandstone, and pointed out the general parallelism there and elsewhere of the flat sides of the pebbles to the planes of deposition, as well as the prevailing uniformity of direction of their longer axes.

He urged that such an arrangement of the pebbles corresponds precisely with the effects of *wave and current action* on water-worn and partially water-borne fragments during their accumulation. The large proportion of pebbles of elongated shape met with in these beds is, he considered, the natural consequence of the mode of disintegration of the original metamorphic rocks from which the pebbles were derived. Such rocks, in virtue of sharply intersecting joints and cleavage planes, are prone in many localities to break up in long, irregular, somewhat rhombic figures, which, by the wearing action of streams and tides, are easily converted into oblong pebbles like those of the Newport conglomerate. Examples of this mode of disintegration are common in the more altered belts of the Appalachian region, especially among the silicious and argillaceous slates along its southeastern border, and may be seen at various points among the similar altered rocks of New England.

To the hypothesis of Prof. Hitchcock that these elongated pebbles owe their peculiar shape and position to the action of powerful pressure upon the strata while the pebbles were in a soft condition from intense heat or other causes, Prof. Rogers urged the following objections.

1. The effect of pressure upon a plastic solid, as shown by Sorby and Tyndal, is in all cases to develop more or less distinct cleavage planes throughout the mass, these planes being uniformly at right angles to the direction of the pressing force. Such an action, applied on a large scale to the strata of conglomerate, must therefore have had the effect not only of flattening the plastic pebbles in a uniform direction, but of developing a cleavage or lamination in them all, parallel to their flat sections as they lie in the mass. But this is so far from being the fact, that we find the cleavage planes of different pebbles running in wholly different directions, sometimes across, sometimes parallel, and sometimes oblique to the general bedding, just as might be expected from the preservation of the original cleavage-structure of the rock from which they were derived.

2. Such a moulding of the pebbles by pressure would either enormously distort or entirely obliterate any fossil forms or impressions which may have existed upon or within the pebbles at the time of their deposit. But an inspection of the *Lingulæ* from the Taunton River conglomerate, and of a similar fossil found subsequently by Mr. Easton in the conglomerate of Newport,

shows that no such violence could possibly have operated on the mass.

3. While in the localities referred to the *majority* of the pebbles have the oblong shape and parallel arrangement above described, there are many scattered through the mass which are either nearly round or have their longer dimensions more or less transverse or even perpendicular to the general direction. As these could not have escaped the enormous all-pervading softening action and pressure which the hypothesis assumes, their presence in these discordant conditions seems of itself a sufficient refutation of the theory.

In regard to the curved form and close adaptation observed in some of the pebbles, Prof. Rogers thought that accidental peculiarities of shape in the original fragment, and the effects of attrition and the close packing of the accumulated deposit, furnished an adequate explanation both of the bent form sometimes met with and the accurate fitting of the contiguous pebble to the concave surface.

As an example of the formation of flattened pebbles by the action of the shore waves, Prof. Rogers referred to the paving-stones of slaty trap recently imported from Newfoundland, which are remarkable for their very uniform circular outline, their smooth, slightly convex faces, and a thickness rarely exceeding one third of their breadth. If we suppose a great mass of these, as they lie piled along the shore with their broad sides horizontal, to be hereafter cemented together as a stratum of conglomerate rock, would not the argument founded on their shape and position be even stronger than in the case of the Newport conglomerate? Yet nothing is more certain than that they owe their shape and arrangement to the peculiar movement and attrition to which they have been subjected by the action of the waves.

Thus, as regards the Newport rocks and most other conglomerates which had fallen under his notice, Prof. Rogers saw no difficulty in referring the form and arrangement of the pebbles to the familiar agencies above indicated. He does not, however, doubt that in some highly metamorphic districts conglomerate rocks are to be found which have sustained great internal changes through the effects of heat, chemical action, and violent pressure. Such he has long thought must have been the conditions in some parts of the Blue Ridge and South Mountain Chain in the Middle States, and such perhaps were the influences which operated on the gneissoid conglomerates of the Green Mountains, to which Prof. Hitchcock has referred in his recent communication to the Society.

Prof. Rogers next made some remarks upon the group of rocks constituting the base of the Paleozoic series in the United States.

He stated that the Potsdam sandstone, as exhibited in New York, forms one of a group of deposits which were long since recognized, in the Virginia and Pennsylvania surveys, as forming together the lowest assemblage of formations in this series. These *Primal* rocks, as they have been named in the surveys referred to, begin, where most developed, with a coarse conglomerate, followed by a great mass of grits and slates, and then by the sandstone with *Scolithos* and *Lingulæ* corresponding to the Potsdam in New York, and the group terminates above with a formation of argillaceous slate, which toward the southwest has great thickness and a predominance of red coloring.

These several members of the Primal series follow each other in a perfectly conformable sequence, resting at their base, more or less discordantly, on the still more ancient metamorphic schists, and other rocky masses, which form the southeastern margin of the Appalachian area. Although no unequivocal marks of fossils have as yet been found lower in the group than the Potsdam sandstone, it is far from impossible that in the less altered portions of the belt the inferior slates and sandstones of the group may disclose distinguishable traces of organized existence.

As the Primal series here described, of which the Potsdam sandstone is the chief fossiliferous representative, occupies the base of the Paleozoic series in this country, and the Primordial group of Barrande has a like position in Bohemia and other parts of Europe, and as the two are found to agree in certain paleontological features, they may be regarded as geologically correspondent, although not *in their details* necessarily equivalent or contemporaneous.

The red argillaceous portion of the Primal series Prof. Rogers regarded as having its counterpart in the remarkable mass of red argillaceous shales and conglomerates occupying part of the southern shore of Lake Superior. He thought that the occurrence of rocks thus characterized, in direct association with the Potsdam sandstone, in regions where the stratigraphical relations are unequivocal, was a confirmation of the generally accepted opinion as to the age of the Lake Superior cupriferous shales. In the presence of this fact, the argument for the Triassic age of these shales, from their texture and color, is entirely *valueless*. Neither does their cupriferous character furnish evidence, as has been supposed, of their Triassic relationship. Throughout a great extent of the Blue Ridge chain in Virginia, and its prolongation toward the southwest, metallic copper and its ores are of very common occurrence, within and contiguous to the basement rocks of the Paleozoic series. Referring to the systematic tracing of the rocks in question by Foster and Whitney, by Owen, and by the Canadian geologists and others, and considering the clear evidence afforded by the continuity of the deposits as well as the presence at different points of characteristic fossils, Prof. Rogers could see no reason for questioning the conclusion now almost universally accepted by American geologists, that the Lake Superior sandstones and shales belong to the lowest of the paleozoic deposits.

In thus maintaining, in common with nearly all American geologists, that this Primal group of rocks forms the lowest member of the Paleozoic series in the United States, — the lowest group in which any traces of organic life have been discovered, — Prof. Rogers would not be understood as asserting that, in some yet unexplored part of the continent, a still lower group may not be found conformably beneath it. As, however, the extensive explorations along its outcrop in the Appalachian belt, the Canadas, and the Upper Mississippi, and observations in the Rocky Mountains and elsewhere, have shown the Primal group, even where most developed, to be limited to a few thousand feet of strata resting discordantly on the so-called Azoic rocks, it would seem highly improbable that any great downward extension of our Paleozoic series will hereafter be brought to light.

Prof. Rogers exhibited a cast taken from the surface of a block of red sandstone, containing the impressions of bones, apparently of an ornithic character.

The rock was found near the landing at Fort Adams, Newport, along with many others brought there for building purposes. It is stated to have come originally from the quarry in Portland, Conn., and evidently belongs to the Mesozoic sandstone formation of the Connecticut valley. Through the liberal kindness of Capt. George W. Cullum, of the U. S. Top'l Engineers, Prof. Rogers has been allowed to remove the valuable part of the block, which at an early day will be placed in the Cabinet of the Society. The specimen is unique, and it is hoped that, when duly examined, it will help us to a more definite knowledge of some of the animals whose footprints are so abundant in this group of rocks.

Dr. C. T. Jackson said that all the localities referred to by Prof. Rogers were familiar to him, most of them having been carefully examined by him in his public geological surveys.

He had at first regarded the red sandstone of Perry, Maine, as New Red or Triassic, but has since been disposed to consider it Devonian. It should be observed that the Devonian series of rocks were not set apart under that name at the time of the geological survey of Maine, but Dr. Jackson had traced the strata of these red sandstones until he found them resting upon rocks now regarded as Upper Silurian, if not Devonian, at Trescott and at Machias. Fossils recently discovered seemed to indicate that his first conjecture, that these rocks are Triassic, was well founded.

As to the age of the red sandstones of Nova Scotia, they were originally described by Dr. Jackson and Mr. F. Alger as New Red, and from comparison of those rocks with those of Connecticut River, Prof. Hitchcock, from mineralogical resemblances alone, first declared the Connecticut River sandstones to be Triassic.

The Albert coal-mine of New Brunswick was regarded as belonging to the lower Nova Scotia coal-measures, but owing to disconnection of the strata and great disturbance of the rocks, it has been impossible for any geologist to demonstrate their true position stratigraphically. The fossil fishes seem to belong mostly to the Carboniferous group of rocks, and are of the genus *Paleoniscus*, and similar to those found in the European coal formations; but there are no fossil fishes in the coal-mines of the Joggins in Nova Scotia, and hence no local comparisons could there be made.

As to the geological age of the sandstones of Keweenaw Point, Lake Superior, Dr. Jackson, in his Report to the United States Government in 1849, had presented all the facts and considerations then known, to solve the question, and in his arguments rather favored the idea that they were of Triassic age, and that they were certainly coeval with the sandstones of Nova Scotia, Connecticut River, and New Jersey, as proved by their parallelism on De Beaumont's system, — identity of composition, — mode of disruption, — characters of associated minerals, and, above all, by the fact that they rest upon Devonian limestones, exactly as do those of Maine and Nova Scotia. Still, since some difference of opinion on this subject was known to exist among geologists who had visited Lake Superior, Dr. Jackson, in his geological maps of the copper regions of that country, had simply denoted those rocks as Red Sandstone of Lake Superior.

The discovery of an Orthoceratite at the Copper Falls mine, and of a *Pentamerus* in the underlying limestones of Sturgeon River, absolutely demonstrate that the sandstones of Keweenaw Point are not Potsdam, and the occurrence of pebbles of Pitchstone Porphyry in the conglomerate of Isle Royale indicates, so far as mineral components can be relied upon, that those conglomerates are more recent than those of the Isle of Arran in Scotland, set down as Triassic by Prof. Sedgwick, and now regarded as Devonian.

The strong geological and mineralogical resemblance between the copper regions of Lake Superior and those of Nova Scotia, New Jersey, and Connecticut, cannot fail to strike every one who has compared them. The identity of the concomitant minerals in the amygdaloid and trap breccias, and in the native copper veins of all these localities, proves similarity of conditions in their formation and of the rocks which produced them. Direct comparisons between the Lake Superior sandstones and the copper-bearing sandstones and shales of Germany by Mr. Marcou seem to have set the question of the geological age of these rocks at rest, at least so far as concerns the copper region of the lake country.

Dr. Jackson said, in so wide an area as the south shore of Lake Superior, hundreds of miles in extent, it is probable that there may be sandstones of a lower series, and he was not disposed to include the Pictured Rocks in the same formation with those of Keweenaw Point and Isle Royale ; but thus far no paleontological evidence has been discovered to indicate the geological age of these sandstones, and no one has ever traced out their stratigraphical relations and order of superposition, beyond what was done by Dr. Jackson and his assistants in his public surveys, the wilderness state of that region rendering the work at present impracticable.

Prof. Agassiz reiterated the opinion expressed at the last meeting, that the sandstones of New Brunswick then referred to are Triassic ; whether those of Lake Superior are of the same age he was not prepared to say. He thought that in the instances cited by Prof. Rogers the paleontological facts contradicted the stratigraphical relations, but his experience had taught him to place implicit confidence in fossils ; and from the examination of these he wished to put on record his opinion that the fossil fishes of the Albert coal belong to a period more recent than all the coal deposits of the Old World, and that the sandstones found in connection with it belong to the Trias and to the New Red.

Prof. Rogers could not admit the Triassic age of the sandstones of the St. Croix in New Brunswick, and the neighboring region of Perry in Maine. These rocks had furnished, at one locality in the latter district, impressions of a plant to which he had formerly called the attention of the Society as closely resembling the *Cyclopteris* (*Sphenopteris*) *Hibernicus*, so characteristic of the Upper Devonian rocks of Scotland and Ireland. Since then he had been confirmed in his opinion as to the affinities of the fossil by the high authority of Prof. Newberry.

As regards the New Brunswick rocks, it cannot be doubted that while most of the belt extending along the northern shore of the Bay of Fundy belongs to Silurian and probably Devonian periods, a large area in the interior is occupied by deposits of

Carboniferous age, which, spreading southeastward around the head of the bay, coalesce with the Carboniferous rocks of Nova Scotia. The group of strata including the asphaltic shales and Albert coal are seen by their stratigraphical relations to form the lowest division of this series. Underlying the gypsiferous shales and limestone, which are succeeded above by the true coal measures of New Brunswick, they occupy precisely the same position as the analogous fossiliferous rocks of Horton and Gaspereau in Nova Scotia, and correspond with the Vespertine group of the Appalachian system. Prof. Rogers illustrated by a section on the blackboard his own observations in regard to the geological place of these rocks, and appealed to the more ample investigations of Prof. Robb and Prof. Dawson to the same effect, showing that so far from being Triassic, these asphaltic fish-beds belong to a period even more ancient than that of the Carboniferous limestone.

Prof. Agassiz invited the members of the Society to be present at the Inauguration of the Zoölogical Museum at Cambridge, on Tuesday, Nov. 13.

Some specimens of *Mallotus villosus* from Labrador were presented by Dr. Bryant.

Prof. Agassiz drew attention to the remarkable difference in the size of the anal fin in the male and female of the *Mallotus villosus*, it being much the larger in the former; this fish was also very interesting to him, as it at one time was supposed to be the only fossil fish identical with living species, an exception to a great paleontological rule; this supposed fossil *Mallotus* he afterward ascertained was taken from a clay-stone of modern formation.

The Corresponding Secretary read letters from Dr. Christopher Johnston, of Baltimore, accepting Corresponding Membership; from the Bavarian Academy and the Verein für Naturkunde at Wiesbaden, acknowledging the reception of the Society's publications.

November 21, 1860.

The President in the Chair.

Dr. A. A. Gould presented the following descriptions of shells collected by the North Pacific Exploring Expedition :

ALABA PUNCTO-STRIATA. T. alba, hyalina, ubique spiraliter tenuissimè striata, striis punctulatis ; anfr. 4 convexiusculis, posticis lævibus, viridioribus, alteris plerumque tervaricosis, varicibus rotundatis niveis : apertura ovata, anticè parum effusa ; labro acuto ; columellâ aurantiaco tinctâ. Axis .18 ; diam. .07 poll. Inhabits Loo Choo Is. W. S.

The generic place of this beautifully transparent and delicately sculptured shell is somewhat doubtful.

RISSOINA TROCHLEARIS. T. parva, crassa, cinerea, ovoidea ; anfr. nucleosis tribus levibus, normalibus 4 convexiusculis, ultimo carinis 7 elevatis acutis cincto, quarum 2-4 (plerumque 3) spiram ascendunt ; interstitiis latè excavatis, sæpè clathratis : apertura ovalis ; peritremate continuo vel in juniorem effuso. Axis .16 ; diam. .073 poll. Inhabits China Seas. W. S.

Resembles *Parthenia exarata ;* and possibly may be a *Rissoa.*

RISSOINA IMBRICATA. T. ovato-lanceolata, porcellana, nitida ; anfr. 8 planulatis, tabulatis, liris imbricantibus numerosis cinctis : apertura ovata, effusa ; peritremate expanso, simplici ; columellâ tortâ. Axis 7 ; diam. 3 millim. Inhabits China Seas. W. S.

RISSOINA FLEXUOSA. T. fusiformis, turrita, straminea ; anfr. 7 convexiusculis, plicis obtusis flexuosis circ. 15 clathratis, et lineis volventibus numerosis cinctis : apertura satis magna, semicircularis ; peritremate simplici, expanso, anticè effuso. Axis 6 ; diam. 2 millim. Inhabits Sydney Harbor. W. S.

RISSOINA NITIDULA. T. acicularis, vitrea, nitida ; anfr. 9 ad suturam profundè declivibus, plicis inconspicuis ad 18 et filis volventibus circ. 4 insculptis : apertura ovata, vix effusa ; peritremate acuto, filis crenato. Axis 5 ; diam. 2 millim. Inhabits China Seas. W. S.

Rissoina villica. T. elevato-conica, turrita, alba; anfr. 9 tabulatis, clathris ad 20 obtusis et liris 4–5 sensim antrorsum decrescentibus decussatis. Apertura modica vix anticè sinuosa; peritremate simplici expanso, vix incrassato. Axis 6; diam. 3 millim. Inhabits Loo Choo and Kikaia. W. S.

Rissoina modesta. T. fusiformis, ventricosa, solida, alba; anfr. 9 convexis, sulcis numerosis longitudinalibus minutis et striis volventibus exilibus decussatis; apice acuminato. Apertura obliqua, anticè effusa; peritremate simplici, expanso, incrassato. Axis 5; diam. 2.25 millim. Inhabits Loo Choo. W. S.

Rissoina strigillata. T. fusiformis, turrita, vitrea, lactea; anfr. 8. convexiusculis; suturâ profundâ; anfr. ultimo clathris elevatis circ. 22, et costis volventibus sensim remotioribus ad 10 cancellato, et ad decussationes gemmato. Apertura parva, vix effusa; peritremate crenato; sulco postsiphonali profundo, et in rimam umbilicalem producto. Axis 5; diam. 2.20 millim. Inhabits Loo Choo Is. W. S.

This and the three following species, having an acute elevated ridge with an adjacent constriction around the beak, and with a predominance of longitudinal folds, constitute a well-defined subgenus which may be called Rissolina.

Rissoina plicatula. T. fusiformis, turrita, cinerascens; anfr. 8 + convexiusculis, plicis acutis rectis 15 ornatis, carinam postsiphonalem amplectentibus; interspatiis lineis volventibus insculptis. Apertura ovoidea; peritremate incrassato. Axis 6; diam. 2 millim. Inhabits Port Lloyd, Bonin Is.; Loo Choo Is.; Kikaia. W. S.

Rissoina lyrata. T. lanceolata, acuminata, albida; anfr. 10 convexiusculis costas acutas flexuosas circ. 23 gerentibus, ad interspatia striis tenuibus volventibus, insculptis, ultimo dimidiam longitudinis testæ subæquante; costâ basali elevatâ acutâ. Apertura angusta, effusa. Axis 6; diam. 2.5 millim. Inhabits Kikaia and Ousima. W. S.

Rissoina tornatilis. T. subulata, acuminata, straminea; anfr. 9 + convexis, clathris acutis longitudinalibus circ. 22, filis elevatis volventibus 4–5 insignibus. Apertura modica, anticè vix effusa; peritremate acuto, extus valdè incrassato, crenato. Axis 5.5; diam. 2 millim. Inhabits Loo Choo. W. S.

ALVANIA ACUMINATA. T. gracilis, turrita, straminea; anfr. nucleosis 3 lævibus, dein duobus bicarinatis, denique 4 normalibus, tumidis plicis subacutis et carinis (3) eleganter cancellatis. Apertura ovata; labro tenui; columellâ aurantiaco tinctâ. Axis 3; diam., 1 millim. Inhabits Bonin Is. W. S.

Closely allied to *A. excurvata*, Cpr.

ALVANIA FENESTRATA. T. minuta, conica, lucida; anfr. nucleosis 2 helicoideis; normalibus 4 ventricosis, anticè aurantiacis, posticè albidis, eleganter fenestratis (clathris angustis circ. 15, liris spiralibus 2, quartâ vel quintâ circa basin haud decussatis) interstitiis quadratis, lævibus. Apertura suborbicularis; labro continuo, acuto; columellâ aurantiaco tinctâ. Axis 2; diam. 1 + millim. Inhabits China Seas. W. S.

Broad in proportion to its length, and exquisitely sculptured.

ALVANIA QUADRATA. T. minutissima, alba, lanceolata; anfr. 4 quadratim decussatis, clathris circ. 16, liris spiralibus 3, circa basin tribus additis. Apertura subovalis; labro incrassato. Axis 1.6; diam. .8 millim. Inhabits China Seas. W. S.

The apex is not perfect enough to decide the genus positively, but the aspect is essentially *Alvanoid.*

ALVANIA PURA. T. elongata, acuta, lactea, nitida, clathris circ. 24 et filis volventibus (5–6) decussata, ad anfr. ultimum filis 10 quorum tribus anticis moniliferis et constrictione alteris sejunctis; anfr. 8 convexis. Apertura semicircularis, obliqua, effusa; labro acuto, varice externo suffulto. Axis 6; diam. 2 millim. Inhabits Simoda. W. S.

ALVANIA LIGATA. T. solida, acutè ovata, subperforata, epidermide rufâ induta et carinis circ. 4 (ad anfr. ult. 7) cincta, sulcis concavis sejunctis; anfr. 5 + ventricosis. Apertura rotundato-ovalis, peritremate integro anticè vix sinuato; labro crasso, expanso, carinis dentato, extrorsum varicoso. Axis 4; diam. 1 + millim. Dredged in Hong Kong Harbor. W. S.

Curious for its dusky exterior and prominent keels like a minute *Planaxis.*

ALVANIA FUSCA. T. crassa, ovato-acuminata, rufa, filis volventibus (8) et filis longitudinalibus majoribus (20) cancellata intersectionibus gemmulatis; anfr. 8 convexis, ultimo anticè constricto. Apertura angusta, ovata, effusa; peritremate continuo; labro acuto, extrorsum varicoso. Axis 5; diam. 1.5 millim. Dredged in Hong Kong Harbor. W. S.

Resembles the preceding in color, but is more elongated and differently sculptured.

CINGULA (?) ATOMARIA. T. minutissima, solida, conica, flavido-aurantia, apice obtuso; anfr. 5 planulatis, suturis impressis; ultimo ad peripheriam subangulato. Apertura suborbicularis, labro posticè incumbente. Axis 1.5; diam, 1 millim. Inhabits China Seas. W. S.

The apex decides it to be a *Rissoid*, though its general aspect is that of *Auriculina*, and by the contraction of the aperture it approaches *Nematura*.

OBELISCUS ORNATUS. T. parva, solida, nitida, elongato-conica, exalbida vel carneola, lineâ rufâ postsuturali et striis confertis exilissimis cincta; anfr. 14 planulatis; suturâ canaliculatâ. Apertura rotundato-ovata anticè angulata; columellâ plicâ posticâ et plicâ medianâ inconspicuâ munitâ. Axis 16; diam. 6 millim. Inhabits China Seas. W. S.

Characterized by its numerous whorls and brown thread. It has the form and size of *O. reticulatus*, A. Ad., and if not new, must be a variety of that species.

OBELISCUS BUXEUS. T. crassa, acutè conica, buxea; anfr. 10 planulatis, ultimo ad peripheriam angulato; suturâ profundâ, angulatâ. Apertura subquadrata; labro acuto; columellâ plicâ solitariâ subparietali munitâ. Axis 6.5; diam. 2 millim. Inhabits China Seas. W. S.

Known by its peculiar color and solitary plait.

SYRNOLA SUBULA. T. valdè acuta, solida, polita, alba; anfr. 9 planatis (lineâ rufâ cinctâ?); suturâ impressâ; basi productâ. Apertura ovalis; peritremate continuo; columellâ plicâ unicâ acutâ, declivi instructâ. Axis 4; diam. 1 millim. Inhabits China Seas. W. S.

It has the continuous peritreme of *Eulimella*, and the plait of *Odostomia*. Not uncommon among fossil forms. The genus has recently been established by A. Adams, and may be his *S. cinctella*.

EULIMA CARNEOLA. T. elevata, conica, suvdiaphana, incarnescente nitidissima; anfr. apicalibus 3 stylinis primo globoso, dein 2 conicis, denique 5 planatis; suturâ vix notatâ; basi rotundatâ: labro haud sinuato; labro incrassato. Operculum tenue, parum spirale, aperturam æquans. Axis 4 +; diam. 1.5 millim. Inhabits Ousima. W. S.

An unusually broad conical species of peculiar yellowish flesh color.

ODOSTOMIA BULLULA. T. minuta, ovata, margaritacea, lucida; nucleo parvo, immerso; anfr. 5 tumidis; suturâ impressâ, marginatâ; basi ovatâ, imperforatâ. Apertura rotundato-ovalis; labro haud sinuato; columellâ acutâ, plicâ inconspicuâ, declivi. Axis. 2 +; diam. 1 + millim. Inhabits Loo Choo. W. S.

ODOSTOMIA PLANATA. T. elongata, pyramidalis, tenuis, lactea, polita; nucleo nutante, immerso; anfr. 8 planatis suturâ vix instrictis; basi perforatâ, protractâ. Apertura ovalis; labro posticè sinuato; plicâ columellari conspicuâ, acutâ. Axis 6.5; diam. 2 millim. Inhabits Hong Kong. W. S.

Well marked by its pyramidal form, perforate axis, and close approach to *Obeliscus*.

ODOSTOMIA SUBPLANATA. T. tenuis, elongato-ovata, lævis, flavo-albida; nucleo parvo, laterali, immerso; anfr. 4 vix convexis, tabulatis; basi productâ, imperforatâ. Apertura ovata; labro haud sinuato; plicâ columellari conspicuâ, acutâ. Axis 2.7; diam. 1 + millim. Inhabits Hong Kong. W. S.

Distinguished from the preceding by its less flattened whorls and imperforate column.

ODOSTOMIA LIRATA. T. majuscula, albida, acicularis; nucleo minuto, laterali, effosso; anfr. 6 rotundatis, liris quadratis (5–7) cinctis, interstitiis eleganter clathratis; basi productâ, perforatâ. Apertura ovalis, parum effusa; labro concinnè serrulato; columellâ flexuosâ, vitreâ, plicâ parvâ, obtusâ, parum declivi. Axis 8.5; diam. 4 + millim. Inhabits China Seas. W. S.

This beautifully sculptured shell has the general aspect of *Monoptygma*, but the columellar twist of *Odostomia*.

Odostomia scalarina. T. elongata, acicularis, albida; nucleo parvo, laterali, celato; anfr. 7 tumidis, posticè subangulatis longitudinaliter obliquè clathratis, clathris circ. 18 subcontinuis. Apertura ovata; columellâ tenuissimâ, plicâ inconspicuâ, declivi. Axis 4; diam. 1 + millim. Inhabits Loo Choo. W. S.

Odostomia obtusa. T. oblonga, ovata, crassiuscula, albida; nucleo parvo, dislocato; anfr. 5 convexiusculis, sulcis circ. 8 remotis cinctis, suturâ impressâ. Apertura ovata; labro incrassato; columellâ tenui, plicâ parvâ acutâ. Axis 2 +; diam. 1 millim. Habitat Port Lloyd, Bonin Is. W. S.

Odostomia viridescens. T. minuta, solida, conica, viridans; nucleo celato; anfr. 5, carinis 3 (5 ad anfr. ult.) conspicuis, perobtusis, cinctis, interstitiis angustis. Apertura ovata; labro incrassato; plicâ columellari eminente, peracutâ, transversâ. Axis 3; diam. .7 millim. Inhabits China Seas. W. S.

Remarkable for its pea-green color.

Odostomia physoides. T. solida, lævis, elongato-ovata, alba; nucleo magno, physæformi, trivolvi, nutante; anfr. 5 convexiusculis; suturâ impressâ; basi rotundatâ. Apertura ovalis; plicâ columellari erectâ, acutiore. Axis 3 +; diam. 2 millim. Inhabits China Seas. W. S.

Distinguished from other species by its minute physa-like apex.

Odostomia soluta. T. lanceolata, tenuis, alba, spiraliter tenuissimè striata; apice helicoideo eminente; anfr. 8 convexiusculis, perobliquis, tabulatis; suturâ benè impressâ; basi acuminatâ. Apertura angusta, lunata; labro acuto; plicâ columellari, modicâ, perobliquâ. Axis 4.5; diam. 1 + millim. Inhabits Loo Choo. W. S.

Monoptygma puncticulata. T. ovato-conica, acuta, lucida, cerea; nucleo satis magno vix nutante; anfr. 7 spiraliter tenuissimè striatis, striis (circ. 7) plerumque minutissimè puncticulatis; basi protractâ. Apertura ovata; labro acuto; plicâ columellari inconspicuâ, obtusâ. Axis 10; diam. 3.5 millim. Inhabits China Seas. W. S.

Monoptygma acuminata. T. parva, subulata, tenuis, polita, ex albo viridescens; nucleo laterali; anfr 10, ultimo dimidiam totius longitudinis æquante, subangulari; suturâ lineari, lineâ subsuturali comitante. Apertura angustè ovata; plicâ columellari modicâ. Axis 6; diam. 2 millim. Inhabits Ousima. W. S.

Monoptygma sinuata. T. ovato-conica, tenuis, albida; vertice declivi, celato; anfr. 6 rotundatis, striulis incrementi, et striis volventibus tenuissimis rugulatis. Apertura ovata; labro acuto posticè sinuato; plicâ columellari acutâ, declivi. Axis 18; diam. 4 millim. Inhabits China Seas. W. S.

Has an Odostomoid look, and in growth is like *Limnea truncatula.*

Turbonilla obeliscus. T. satis magna, solida, elongata, albida; nucleo trivolvi, lucido, nutante; anfr. 12 planatis, clathris 20–36 obtusis, interdum interruptis ornatis, interstitiis parum impressis antrorsum sensim evanescentibus; basi subglobosâ. Apertura ovato-quadrata; labro tenui; columellâ parum intortâ. Axis 10.5; diam. 3 millim. Inhabits Simon's Bay, at low water, under stones. W. S.

Turbonilla cælata. T. ovato-turrita, obtusa, solida, alba, nucleo bivolvi, helicoideo, nutante; anfr. 9 planatis, tabulatis, clathris 20–24 rectis plerumque continuis, angustis; interstitiis æquantibus, striis 10–12 spiraliter exaratis; basi rotundatâ minus insculptâ; columellâ valdè intortâ. Axis 6.7; diam. 1.7 millim. Inhabits Hong Kong. W. S.

Well marked by its obtuse point, deep sculpture, and strongly twisted pillar.

Turbonilla ornata. T. gracilis, ochracea, fasciâ præsuturali, et basali albidâ cincta; anfr. 8 + planatis, clathris rectis validis obtusis omnino munitis; interstitiis vix æquantibus profundis, striis 10-14 spiraliter insculptis; suturâ impressâ; basi ovatâ. Apertura ovata; columellâ haud valdè intortâ. Axis 6.7; diam. 1.5 millim. Inhabits Hong Kong. W. S.

Similar to *T. interrupta.* Prettily ornamented by its pale base and suture with orange band shading into pink.

Chemnitzia iota. T. minima, gracillima, lactea; nucleo helicoideo, bivolvi, inclinato; anfr. 6–8 subplanatis, tabulatis, clathris rectis conspicuis 14–16 et striis volventibus (6–10) ad interstitia quadratim omnino decussatis. Apertura ovalis; columellâ vix intortâ. Axis 2 +; diam. .7 millim. Inhabits —— ?

Two somewhat worn specimens vary a good deal in size and form.

Chemnitzia circumdata. T. ovato-conica, polita, straminea vittâ aurantiacâ cincta; anfr. 8 vix convexis et sutura vix indicatis, posticis plicis numerosis indistinctis ornatis, ultimo haud insculpto et vittis 5 ornato. Apertura angusta; peritremate acuto. Axis 5; diam. 2 millim. Inhabits Sydney Harbor. W. S.

Chemnitzia trachealis. T. pyramidalis, solida, alba; nucleo parvo, valdè declivi; anfr. 8 costis rotundatis validis 4 cinctis, quaram unâ tenuiore sæpè in suturam celatâ; interstitiis omnino tenuissimè clathratis. Apertura ovata; columellâ vix intortâ. Axis 5.7; diam. 1.7 millim. Inhabits Simon's Bay. W. S.

In the deficiency of the columellar fold it differs from the Chemnitziæ generally, as well as from Chemnitzia proper, in the absence of bars and in the spiral sculpture. For these peculiarities Mr. P. P. Carpenter * proposes a sub-generic distinction under the name of s. g. Polyspirella. It is intermediate between Aclis and Parthenia.

Dunkeria effusa. T. valdè protracta, gracillima, albida; anfr. 10 tumidis, posticis sejunctis, lirulis rectis circ. 30 sæpè confluentibus clathratis, interstitiis tenuissimè decussatis. Apertura ovata; columellâ parum intortâ. Long. 6; lat. 1 + millim. Habitat Loo Choo. W. S.

This elegant little shell connects Chemnitzia with Aclis, from which it differs in its fine bars and slightly twisted columella.

Cœcum gracile. T. valdè teres, parva, alba, annulis circ. 24, approximatis, subacutis ornata. Apertura haud contracta, nec declivis, annulo crasso cincta; margine laterali subplanato; operculo? Long. 2; diam. .3 millim. Inhabits China Seas. W. S.

* To Mr. Carpenter I am greatly indebted for working out the diagnoses of very many of the smaller shells described in this paper.

The only specimen found is worn and defective, but clearly distinct from any yet described. It is most like *C. pulcherrimum*, but is more slender and has the rings closer. It belongs to the group *Anellum* of Carpenter, the best authority on this genus, and to whom I am obligated for determining this species.

Another species closely resembling *C. elongatum*, but too young and imperfect for description, was obtained. These are the only specimens yet noted from the Japan or China seas, where they seem to be much more rare than in tropical American waters.

Hyala abnormis. T. pupæformis, hyalina, tenuissima, straminea, valdè distorta; nucleo celato, declivi; anfr. 4 nonconformibus, posticis citò crescentibus subangulatis, ultimo cylindrico, elongato anticè contracto; suturâ profundâ, quasi incisâ. Apertura subrotunda, effusa; columellâ plicâ posticè munitâ. Long. 1.7; lat. .6 millim. Inhabits China Sea; coral regions.

This very curious little shell, so remarkable for its short, distorted spire and deep suture, if not a distinct genus, is allied to *Stylifer*, and may for the present be assigned to this genus or to the subgenus *Auriculina*, Gray, which seems to be equivalent to *Jeffreysia* or *Rissoella*. Odostomoid shells without a folded lip; though I think a distinct posterior fold is to be made out in this specimen. The animal alone can settle its true position.

Cheletropis globosa. T. minutissima, pellucida, lævis, tenuissima; nucleo declivo, celato; anfr. 4 tumidis; suturâ perspicuâ. Apertura ovata (?); peritremate continuo; columellâ valdè sinuatâ (forsan plicatâ). Axis 1 +; diam. 8 millim. Inhabits China Seas. W. S.

Two specimens of this very minute shell, quite fresh, were obtained, both having the aperture somewhat fractured. Its generic place is doubtful. The somewhat beak-like prolongation and its tenuity seems to attach it to this genus, which is considered to be a Pteropod. If it does not belong here, it must be allied to the preceding shell.

Carinaria cornucopia. T. parva, hyalina, elongata, subtriangularis, compressa, plicis angulatis reclivibus ad cristam retrorsum inclinatis ornata; apice spirali anfractus 4 dextrorsum, unicum sinistrorsum volventes monstrante; cristâ elevatâ, lunatâ, spiram haud attigente. Apertura angusta, ovata. Long. 10; diam. maj. 5; diam. min. 5 millim. Taken at sea south of the Caroline Is. W. S.

The unusual length of the shell, the very elevated crest, equalling half the major diameter, and the waved, almost plicate surface make this a strongly marked species.

Prof. Rogers presented some fine impressions of fossil shells from an island in Saco River, obtained from a boulder two hundred feet above the level of the sea.

This boulder, if boulder it be, is very large, buried at the base, and crowded with Devonian fossils. The rock is like that at Dennis River, and perhaps there may be an outlying patch at the mouth of Saco River.

Dr. Jackson confirmed the opinion of Prof. Rogers that it is a boulder; he was well acquainted with this region, where a band of this rock crops out on the Aroostook River, to north of Moosehead Lake, from which boulders are scattered even to the outer islands of Penobscot Bay. He observed that this is an exceedingly interesting region to the geologist on account of the extent and perfection of the drift phenomena.

Mr. Marcou exhibited a young growing cactus, the *Cereus giganteus*, from the river Gila.

Prof. Rogers presented the following account of observations on the coiling of the tendrils of the winter squash.

These statements are selected from a number of observations intended to mark the rapidity, force, and other particulars of the coiling movement. They were made during the last ten days of August, 1859, the appearances being noted at 3 P. M. of each successive day while the observation lasted.

1. *Aug.* 20, 3 P. M. A smooth, round stake, one fifth of an inch in diameter, was planted in contact with the inner side of a tendril, about an inch from its slightly incurved extremity. A similar stake was placed behind, and touching the thick, trailing stem from which the tendril issued, for the purpose of marking

the distance through which the tendril might pull the plant in the progress of coiling. In a few minutes after placing the first stake the end of the tendril was seen to have moved perceptibly towards the stake, but in this case no note was taken of its rate of bending.

Aug. 21. The tendril had made two turns around the stake, and had besides formed two close spires next to it, and two large open ones towards the stem. The plant had been drawn away from the second stake nearly one inch.

Aug. 22. Six close coils had been formed next the first stake, and the same number of open ones towards the stem. The plant had been moved two inches.

Aug. 23. There were eight coils next the stake, wound so tightly as to touch, and eight larger and opener towards the stem. The plant had been pulled away from its first position between two and a half and three inches.

Compared with other like observations, this is an average example of the rate of formation of the coils, and of the force which they exert in moving or bracing the stem.

The form assumed by the tendril is that which would be produced by a coiling force applied in a uniform direction midway on a flexible line with fixed ends; that is, the number of turns is the same for the outer and the inner half of the tendril, but the direction is opposite, making the one a dextral and the other a sinistral spiral, and leaving between the two a comparatively straight space or a loop at which the transition occurs. Where two or three such pairs of coils are formed in the same tendril, as sometimes happens, the aggregate of the right hand turns is still always the same as that of the sinistral.

2. One extremity of a short thread was tied around the curving end of a young tendril, and the other fastened to a stake. On the following day the tendril was found to have made one close turn around the thread, and after this it formed itself into a coil of several turns, all in one direction, the thread being twisted to correspond with the opposite spiral.

3. As in the preceding cases the whole length of the tendril shared in the coiling movement, it became interesting to determine if any one section of it when fixed at the ends would act in the same way.

With this view a long tendril was bent at an angle of 60 degrees around a stake placed midway in length, and was confined in this position by a second stake placed near its curving end, and in contact with the opposite surface.

Soon after this adjustment was made the free curved extremity began to close upon the stake. In twenty-four hours this end had made two and a half turns around the stake, and the portion between the two stakes had begun to twist, but no spire had yet formed. The day following it showed an imperfect open spire, and on the third day it had formed two strong coils adjoining each of the stakes, the turns as before being oppositely directed, and having a nearly straight segment between them.

4. In many cases the motion of the curving end of the tendril was sufficiently rapid to carry it through a sensible angle in the first five or ten minutes. Even when the tendril appeared quite unimpressible when thus watched, it was usually found by the next day to have moved through a considerable space. This capacity of motion would seem to be greatest at a particular stage of growth and afterwards to decline.

The following experiment exemplifies the great activity of the tendril in favorable circumstances:

A tendril four inches long, which had bent itself into a wide hook at the free end, was brought in contact by its concave surface with a smooth, round stake, leaving about three-fourths inch of the outer part of the hook projecting on one side. The coiling action began at once, and could easily be followed by the eye. In fifteen minutes the outer part of the hook had worked through half a circle, and the stake was clasped in a close coil.

OBSERVATIONS ON THE HABITS OF A SPECIES OF HORNET (*Vespa*), WHICH BUILDS ITS NEST IN THE GROUND. BY PROF. JEFFRIES WYMAN.

The colony of hornets which is the subject of the following observations, was first noticed towards the end of August, while they were making a nest in the slope of a bank in Cambridge. The process of excavation was still going on, as was obvious from the fact that each worker came out with a pellet of earth in its jaws. As long as they were not interfered with they allowed any one to approach quite near to the nest and watch their movements unmolested. The earth which they brought out was always carried to a considerable distance. On leaving the nest they generally rose eight or ten feet in the air, and on running beneath them and watching them till they were lost sight of, which was usually at the distance of one or two hundred feet from the nest, they were never seen to drop their load. The earth was not carried in any particular direction, but to all points of the compass. Sometimes they brought out a heavier load than they could rise with on the wing; when this was the case, after making several ineffectual efforts to fly away, they always carried it back again into the hole. When there was a strong wind they were frequently blown into the grass, from which they found it difficult to disengage themselves, but under such circumstances they never abandoned their load.

The number of arrivals and departures at the entrance was sometimes only five in a minute, and at others as many as forty-five. The rain did not materially interfere with their work. Occasionally those going in opposite directions near the nest met in the air, when the one going out was almost always knocked down by the one returning, the first having the disadvantage of just starting as well as the incumbrance of a load.

Some sugar which was placed near the entrance was not touched by them, and was eventually carried away by the ants, who were not molested. Fruit was also left without being eaten by the hornets. Insects thrown down near the hole were at once seized and carried in. A dragon-fly, which after several attempts proved too heavy for one of them to move, was cut in two by a few strokes of the jaws, and the hinder part of the abdomen carried off.

Death was an occasional visitor among the larvæ, for their dead bodies were frequently brought out, and like the loads of earth, were carried off to a long distance.

Sometimes one, and at others four or five, stood at the entrance, performing no work nor moving about, but keeping their wings constantly vibrating. The object of this did not appear. The bees have a somewhat similar habit for ventilating their hives, but then a much larger number are associated for the purpose.

When the entrance to the excavation was accidentally injured it was repaired, or if an additional opening was made, it was walled up. If a small one, only a single worker was occupied on it at the same time. Such a hole, which had been nearly walled up, was reopened by one of their number, the newly made barrier broken down, and the materials scattered about, for no obvious reason.

On the 21st of September, during a storm, the walls at the entrance of the excavation fell in, exposing the top of the nest, which was about three inches below the inlet. Five or six workers at once commenced repairing the injury with material brought from the excavation. Each builder, as he came out with a pellet of earth in his mouth, walked about in different directions, seeming to hesitate where to begin. At length having determined upon a place, the earth was passed from the jaws to the fore pair of legs, and there held while successive portions were bitten off and fitted into place by the jaws. A sharp ridge was first constructed on the borders of the entrance, and gradually strengthened by additions to its sides. A net-work of ridges was built outside of this, and the interstices gradually filled up.

While performing their tasks the workers were trodden upon and most unceremoniously walked over by the others as they came and went, but of all this they took no notice, and continued at their labor as if unconscious of the presence of others.

On the 25th the repairs were completed, and an opening which would have admitted four fingers was so far contracted as to be large enough to admit only one. The nest which had been previously in sight through the entrance, soon disappeared from view, and, as was afterwards shown, was undermined, and sunk several inches deeper.

Oct. 5th. Some specimens were caught for preservation in alcohol. Previously I had peered into the hole each day without molestation. They had crawled over my clothes and hands, but had shown no disposition to sting. After a few had been captured their temper began to change. Instead of flying in a direct line, as they were ordinarily accustomed to do on leaving the hole, they would when irritated move for a few seconds in a zigzag course, making a louder sound than usual, and then charge with force against some part of the body. One of them which stung the finger, as it forced itself away tore off the sting and the poison bag, which were left behind fastened in the wound.

Oct. 12th. Early in the morning some ether was poured into the hole, and the entrance closed until they were all insensible. A few only had gone abroad, and these were captured one by one as they returned. On opening the cavity containing the nest, the excavation was found to be a cylindrical pit about one foot in depth and seven or eight inches in diameter. The nest was not suspended, as is the case with that of an analogous species in Europe, nor was there any evidence that it had been, but rested on the bottom of the pit. It was five inches in its vertical and six in its transverse diameter, and of a nearly spherical form. It had an outer covering of paper, as in the case of the hornets building under the eaves of houses or on trees, but was much more frail, and could scarcely be touched without breaking to pieces. The covering was not arranged in concentric layers, as in the nest of the other species, but consisted of numerous convex scales or plates which overlapped each other and adhered by the edges. Several stones were embedded in the walls. These had been set free during the process of excavation, and as they were too heavy to be removed, had fallen to the bottom, and were eventually built into the walls of the nest as it was finished below.

The combs consisted of four stories, each suspended by several pillars from the one above it, and the first from the roof of the nest. As in the more common species, the edges were not in any instance attached to the walls. The three upper combs contained cells measuring about 0.17 of an inch in diameter; but those in the fourth and lowest, therefore the last built, were much larger and deeper, varying from 0.21 to 0.23 of an inch in diameter. These were for the use of female larvæ and pupæ, while the others contained those of males and workers. The larger portion of the cells for the females had been used, and others were still occupied by pupæ, and the entrances were still sealed up. Those which had been occupied had deposits of animal matter at the bottom of them. Five queen cells were still occupied.

The adult population of the nest was nearly as follows:

Queens, or females	24
Males	236
Neuters, or workers	388
Total	648

There were also between one and two hundred larvæ.

		inch.		grains.
The length of the	females	0.82	Average weight,	3.90
" "	males	0.70	" "	1.68
" "	neuters	0.50	" "	0.87

When placed in alcohol the males all floated, but the females and neuters sank to the bottom.

Females. The top of the head and eyes are black; a narrow yellow stripe descends along the sides of the head, behind the eyes as far as the base of the jaws; the forehead is yellow, as also the clypeus and jaws, these last being bordered with black; the base of each antenna is surrounded by black; a yellow spot, rounded above and pointed below, occupies the emargination of each eye, its point ending near the base of the antenna. On the middle of the face a vertical black stripe extends from the forehead on to the clypeus, and on either side of the lower end of it is a black dot. The whole face in covered with hairs, those on the top of the head are black and long, the others shorter and of the color of the surface on which they rest.

There are three ocelli on the top of the head, forming a triangle with the apex forwards.

The antennæ have thirteen joints;* the first is short, the second is long, and both are hairy. The end of the antenna is club-shaped. The jaws are quadrangular and bordered with black; the cutting edge is obliquely truncated, three-toothed, the teeth confined to the hinder half of the edge, and the hinder angle being the most prominent.

The maxillary palpi are six jointed.

The lip consists of three parts; the middle broadest, bilobed at its free end; the lateral pieces are much more slender, and separated from the middle one by a deep cleft. There is a dark spot (glandular?) on each lobe of the middle piece, and on the end of each lateral piece. The labial palpi are four jointed, the points longer and more slender than those of the maxillary palpi.

* Westwood states that in the Vespidæ, the antennæ have twelve joints in the females and neuters and thirteen in the males; by reference to his figures it appears that he has overlooked the basal joint, which is very small and imbedded in the surface of the face. See Introd. to Modern Classif. of Insects. Vol. ii. p. 244. London: 1840.

The terminal joints and outer base of maxillæ are hairy, as also the base of the lip and the basilar joint of its palpi.

The thorax is black; an oblique yellow stripe commences on each side of the back, near the base of the wing, and the two converging meet near the head; the meso- and meta-thorax have each a pair of yellow spots of a somewhat triangular shape; there is also a triangular spot on the side of the thorax under each wing.

Abdomen. The segments are yellow and somewhat differently bordered with black on their anterior edge. In the middle of the first segment a broad triangular black spot is united by a narrow neck to the middle of the black border. In the second the border extends backwards in a triangular form across nearly the whole breadth of the segment; in the succeeding segments this projection is represented by a narrower and more pointed one. Each segment has a pair of nearly square black spots, which are much smaller near the last segment.

The legs are yellow, with the exception of the coxæ and base of the femora, which are black, as also the anterior border of the femora of the first pair of legs.

Neuters. The head is the same as in the females. Antennæ have thirteen joints. Thorax as in the female. The black bands of the abdomen are much broader on the back, covering nearly the whole breadth of the segment, and have each three projections, one median and two lateral, but not very strongly marked; these correspond with the central projections and the pair of black spots of the female. The black bands are not so broad on the abdomen as on the back.

Males. Head proportionally much smaller, jaws less powerful, and the abdomen more slender than in either of the preceding. A small black spot exists on the forehead, but none on the clypeus; in other respects the distribution of the yellow and the black markings is nearly the same as in the neuters.

The antennæ are fourteen jointed; the first and second joints are hairy; the second has a yellow spot on its base.

The external markings on the females and neuters, especially those of the face, are liable to some variation in different individuals. The middle stripe of the face may be continued on either side, so as to unite with the lateral dots, thus forming an inverted T shaped mark; or the stripe may become nearly obsolete and reduced to a point, and this with the other two dots forming a triangle.

Although there are transitions from one of these varieties to the other, yet the whole series of females and neuters is divided into the three groups according to the types of markings just described, and it is interesting to notice that those on the face correspond very nearly with the more ordinary markings of some of the other species; the first, for example, with those of *V. vulgaris;* the second, with those of *V. Germanica;* and those of the third, with the markings of *V. arborea.*

The species here noticed does not appear to have been described; certainly it does not agree with either of the European species of similar habits described by Saussure in his admirable monograph. As he is about publishing a memoir on the North American Hymenoptera, with an abundance of materials, it is hardly worth while to do anything more at present than to offer general remarks.

A comparison of the habits of the European and American wasps shows the existence of two distinct groups both in the Old and in the New World; one group constructing their nests in the trees, or suspending them from the eaves of houses, and the other making them in the ground. Those having the latter habit, are the *Vespa vulgaris, V. Germanica,* and *V. rufa.* The details of the construction of the two kinds of nests seem to be widely different; those hanging free in the air are usually provided with an envelope composed of concentric layers of paper, the outer ones being somewhat irregular. The only description of those of the second group which is given by Reaumur, and copied by all subsequent writers, represents the envelope as made up of irregular pieces of paper, these being in the form of a bivalve shell and fastened to each other by their edges, and overlapping in an imbricated manner like tiles. The nest which I have here described corresponds very well with Reaumur's description, which relates to that of *V. Germanica,* except that the paper in the American nest is much more brittle, and has not sufficient tenacity to allow of its being handled without falling to pieces.

The American species also resembles one at least of those of Europe, in the habit which it has of carrying away the earth brought from its excavation, (see Westwood, Introd. to Classif. of Insects, vol. ii. p. 247.)

The few experiments which I made show their carnivorous propensities, but do not manifest the same tendencies to eat sugar and fruits which are said to be so common in the species of Europe.

At the end of the autumn, a large number of larvæ still remained, as well as a few pupæ of females, which have not yet matured. These now remain in a state of hybernation, and will be preserved until the next spring, to await the effect of warm weather. The pupæ of the species whose habits have been heretofore described are all supposed to come to maturity in the autumn; while the queens in their perfect condition alone survive the winter to begin a new colony in the spring.

Dr. C. T. Jackson announced that the andalusite macle, alluded to at a previous meeting as occurring at Boar's Head and the White Mountains, has been found at the intermediate position of South Berwick, Maine.

A halcyonoid polyp of the family *Gorgonidæ*, taken in eighty fathoms of water, in the Bay of Fundy, thirty miles southeast of Mount Desert, was presented by Mr. Lemuel Moore, of West Trenton, Maine.

The polyp was living when it was taken from the water, and it required considerable force to detach it from the bottom; other specimens were obtained at the same time. This is the first time that anything like this has been noticed on the American coast, at any rate in that latitude.

Dr. Horace Richardson and Hugh Montgomery, Esq., of Boston, were elected Resident Members of the Society.

December 5, 1860.

The President in the Chair.

Prof. W. B. Rogers made some remarks on the paleozoic rocks of Dennis River in Maine, as compared with those of certain parts of Nova Scotia recently described by Prof. Dawson in the supplement to the Acadian Geology.

Among the specimens from the former locality, Prof. Rogers had found *Calymene Blumenbachii*, *Discina tenuilamellata*, *Cornulites flexuosus*, *Tentaculites distans*, *Atrypa reticularis*, an *Avicula* apparently identical with *A. Honeymani*, and a *Chonetes*, closely resembling *C. Nova Scotica*, all of which are mentioned by Prof. Dawson as occurring in the rocks at Arisaig and New Canaan, in Nova Scotia. Along with these forms are *Beyrichia lata*, *Spirifer sulcatus*, *Leptæna rugosa*, *Orthis elegantula*, *Modiolopsis ovatus*, and others, the whole constituting a group suggestive of an Upper Silurian age. As the specimens at this locality are mostly in the condition of casts more or less distorted by cleavage, some of the above identifications may hereafter require correction, but enough is clearly made out to show the near correspondence of these Silurian groups of Maine with those of Nova Scotia.

Viewing the different localities in connection with one another, and with the recently discovered Trilobite beds of Eastern Massachusetts and Newfoundland, it would seem probable that we have here parts of an extensive paleozoic area, of which the greater portion is submerged beneath the adjacent expanse of the Atlantic.

Prof. W. B. Rogers commented on the view recently put forth by M. Barrande in regard to the existence of a primordial fossiliferous group in North America extending through a great thickness of strata below the Potsdam sandstone, and on the revival in this connection of the Taconic system of Prof. Emmons. He expressed the highest admiration for the labors of M. Barrande in paleozoic geology, but felt sure that a more complete knowledge of the conditions in which our lower fossiliferous rocks occur would lead him to a different conclusion.

In considering this subject, it is important to bear in mind that no question is made as to the *existence* in this country of what M. Barrande would designate as his primordial series. This is already recognized in the Potsdam or Primal group of our American geology. But the evidence of observations covering the whole margin of the Appalachians, and ranging through Canada, the Northwestern States, and the prolonged outcrop in the Black Hills and Rocky Mountains, has concurred in proving that this primordial fossiliferous group is not extended downward as claimed by M. Barrande, but that it rests *discordantly* either on Plutonic rocks or on ancient metamorphic schists in which hitherto no unequivocal fossil forms have been discovered. As this Potsdam group throughout most of its outcrop is confined to a thickness of a few hundred feet, and even where most expanded does not exceed two or three thousand, there appears to be no reason for considering the primordial series as extending farther below the Potsdam sandstone proper than the same restricted limits.

Adopting the Taconic theory as formerly maintained by Prof. Emmons, the Potsdam group would be *included*, from the oldest system of fossiliferous rocks, and the latter would have to be sought in the rocky masses on which the Potsdam is seen to have been discordantly deposited. This severance of the Potsdam group from these subjacent rocks is, however, not the view suggested by M. Barrande, and maintained by Mr. Marcou in his recent communications to the Society. On the contrary, they propose to leap over the great stratigraphical break which separates them, and to unite the Potsdam group with these older supposed fossiliferous rocks into a single system, the American equivalent of the primordial series of Europe.

Were we assured of the occurrence of a Primordial fauna in these discordantly subjacent rocks, we might with reason claim to unite them with the Potsdam into a single paleozoic system as here proposed. But until this downward extension of the primordial fossils has been unequivocally proved, the universality of the stratigraphical break between the two sets of strata must furnish the strongest presumption that they appertain to *distinct geological systems.* In maintaining this as the natural inference from the facts, it is by no means intended to imply that the subjacent so-called azoic rocks have from the beginning contained no traces of organic life, or even that in the progress of research distinguishable fossils may not be discovered in some of their divisions. But, judging by the usual law which associates great changes of fauna with great and wide-spread discordance of stratification, it would seem most probable that the organic forms, should such be found in these underlying rocks, instead of belonging to the Primordial fauna as heretofore defined, would form a separate group equally marked and peculiar, and claiming for itself a distinctive name.

In view of these considerations, and of the facts thus far known, Prof. Rogers could not perceive any valid reason for maintaining that the primordial series of deposits extends in this country below the base of the Primal or Potsdam group. He knew of no satisfactory evidence of the occurrence of fossils of any kind in the rocks found unconformably below this group, notwithstanding the vast extent through which its outcrop had been traced, and he could, therefore, see no ground for the opinion expressed by Mr. Marcou that the Potsdam sandstone is the cover rock "capping a system of 30,000 feet of fossiliferous strata."

Referring to the fossils of primordial character discovered at Georgia and Point Levi, Prof. Rogers alluded to observations which he had made some years ago in Western Vermont, in which he had traced the group of reddish arenaceous and calcareous rocks overlying the characteristic Hudson River strata, northward from the flank of the Snake Mountain to near the Canada line. Although he had not visited the spot in Georgia where the trilobites are found, the uniform and moderate eastern dip in the belt bordering the lake and embracing this locality impressed him with the belief that these trilobite layers are included in regular sequence in this upper group. The observations of Prof. Hall, and the recent sections of Prof. Hitchcock in the Vermont survey, had conducted to the same result. As to the age of the Point Levi rocks and the true place of the fossils contained in the conglomerates, he must rely upon the high authority of Sir Wm. Logan's observations.

In regard to the bearing of this stratigraphical question upon the generalizations of paleontology, Prof. Rogers admitted that the discovery of primordial forms at so high a level would be a remarkable and exceptional phenomenon. Such exceptions, however, have been recognized in a greater or less degree in other parts of the paleozoic column. It should be kept in mind that an induction to be true must be founded on all the facts. We cannot, therefore, accept as an *absolute law* in paleontology the principle that like organic types are excluded from reappearing in a given region after having once, and for a long time, disappeared. Indeed, the doctrine of colonies proposed and admirably illustrated by M. Barrande, in connection with some of the Bohemian rocks, is itself a striking instance of departure from such a law. Nor is it easy to place a limit to the interval of such possible recurrence, in the face of the fact stated by M. Barrande, that in one instance a certain group of fossils makes its appearance in a given stratum, then vanishes, and after the accumulation of *three thousand feet of overlying deposits*, reappears to form part of a great characteristic fauna.

Such a *precursory* appearance of a fauna does not seem in any way more probable than the repetition locally of fossil types, long after the disappearance of the analogous forms which marked a more ancient series of deposits. Emigration, in connection with other considerations mentioned by M. Barrande, would explain the one as readily as the other.

Mr. Marcou explained the Primordial fauna of Bohemia according to Barrande; he admitted the supremacy of stratigraphy, and said that precisely what he wanted in regard to disputed points in the Taconic system, was a section of the country under consideration; with such a section all geologists could judge for themselves, and verify or disprove the assertions in regard to it.

Dr. C. T. Jackson exhibited a specimen of Boghead coal, from Torbanehill, Scotland, containing a fine specimen of *Stigmaria;* this he considers as the underground stem of *Sigillaria*, and the scars of the surface as the marks of buds.

Dr. Pickering remarked that the lateral impressions on this specimen looked to him like those of leaves of some coniferous tree, like *picea*, resembling the Dammara pine of New Zealand and the Feejee Islands. The coal exhibited may be the product of the resin of this pine, and, if so, might with advantage be compared with the New Zealand gum-copal, which differs somewhat from resin. He did not think the impressions bore any resemblance to those which would be made by roots.

Dr. Jackson also exhibited specimens of coal from the Gulf of Chiriqui, between Costa Rica and Panama, discovered by Dr. John Evans.

It contains about forty per cent. of bituminous matter, with nine per cent. of ash; it is well adapted for steam engines, for the manufacture of gas, and for similar purposes, and, if existing in large quantity, will be of immense value to this region. Judging from the fossils which accompanied the specimens, such as *Cardium*, *Cerithium*, *Arca*, *Natica*, *Mytilus*, and other shells, this coal belongs to the upper Eocene period.

Mr. Marcou observed that all coal hitherto found within the tropics has been Tertiary, and does not belong to the true coal measures; the latter have always been formed and found either in arctic or temperate zones, in swampy regions; during the true Carboniferous deposits the terra firma was found under the tropics.

Dr. C. T. Jackson exhibited a microscope recently made for him by R. B. Tolles, of Canastota, N. Y.

This is the inverted microscope of Prof. J. Lawrence Smith, described by him in the American Journal of Science and Arts, vol. xiv. p. 233, 1852. It is peculiarly adapted for the use of the chemist, the object to be examined being placed above the objective lens, while the tube is inclined at an angle of 45°.

Mr. Verrill exhibited some specimens of minerals.

The first was a piece of tin ore, from Mt. Mica, Paris, Me., and was part of a mass which weighed five pounds; he had also found several smaller specimens, some beautifully crystallized, scattered through the mass of rock constituting the vein; they were generally in contact with albite or quartz.

A second specimen he supposed to be native arsenic, though it may contain an admixture of other substances; it occurred in a vein about three inches wide, inclosed by felspar, of limited extent, and passing through granite. It was found on the eastern flank of Furlong Mountain in Greenwood, Me. In a neighboring locality he also found the same mineral disseminated through the rock in small masses. At other localities on the same mountains are found beryls of large size, black tourmaline, ilmenite, and black garnets.

A third was a crystal of chrysoberyl, found on a hill near Norway village, Me., in granite associated with large garnets and rose quartz; it was of unusually large size. In regard to the first specimen, Dr. Jackson remarked that it was very interesting, as the localities of tin ores in this country are very few.

A donation of several hundred specimens of shells of the Indo-Pacific fauna, comprising nearly two hundred and fifty species, was announced from the Smithsonian Institution.

Though nearly all the species were already in the Society's Cabinet, these will be valuable for exchanges. The thanks of the Society were voted for the donation.

Mr. Theodore Lyman presented a description of a new star-fish, as follows:

ASTROPHYTON CARYI, Lyman, (n. s.)

Special Marks. Disc very distinctly granulated above, without spines. Finer granulation at the outer side of the mouth-angle and along the edge of the genital slits.

Description of a specimen. Diameter of disc, 35 millim. From outer side of madreporic shield to outer corner of opposite mouth-slit, 16 millim. Width of arm, at base, from 9 millim. to 13 millim. Length of arm, measured along the branches, 116 millim. Distance from outer side of madreporic shield to inner points of mouth papillæ to that between outer corners of mouth-slits, 11 : 5. Madreporic shield very indistinct, oval, irregular, longer than broad. Teeth, tooth-papillæ and mouth-papillæ stout, regular, conical; about twenty-four in number; those near the outer corners of the mouth-slits rather smaller; most of them are clustered near the point of the mouth-angle. Arms covered above and on the sides with fine grains, which are grouped near the base of the arm in irregular, vertical ridges; these ridges become more regular and distinct toward the end of the arm, and, on the smaller branches, take the form of a double vertical row of grains; along the middle line of the arm runs a very obscure, narrow furrow, in which the grains are rather more scattered. Under side of the arms covered with a smooth skin, beset with fine, scattered, smooth grains; the joints are indicated by very faint cross lines. Interbrachial spaces above, and brachial spaces between the radial ribs, sprinkled with a few fine grains, like those of the arms, but coarser. The upper and lower surfaces are separated by a raised edge, which is slightly granulated. Radial ribs extending quite to the centre, closely beset with coarse, rounded grains; length to breadth, 17 : 5. Interbrachial spaces below covered with a very smooth skin which is sprinkled with fine, rounded grains. Genital slits bordered, on the side next the interbrachial space, by rows of fine grains. The granulation of the interbrachial space extends to the base of the mouth-angle. Arm-spines hooked, microscopic, the lowest one largest, arranged in two vertical rows; they are abundant on the end twigs, but are not found on the main trunks within the seventh fork from the disc. Tentacle-scales three, sometimes four, and, within the disc commonly two; spiniform like the teeth, but blunter; they extend within the inner end of the interbrachial space. Color, in alcohol, above, light Vandyke brown; interbrachial spaces darker; below, under surface of arm nearly white; interbrachial spaces same as above. A single specimen has been sent from San Francisco by Mr T. G. Cary to the Museum of Comparative Zoölogy.

Astrophyton Caryi is distinguished from *A. eucnemis*, which it resembles, by more regular granulation of the disc, by having blunter tentacle-scales, and by close rows of grains along the edge of the genital slits.

Mr. Norman Easton, of Fall River, was chosen a Corresponding Member of the Society, and Messrs. Rice, Edward Pickering, Richard C. Greenleaf, and Wm. Eliot Lamb, all of Boston, Resident Members.

December 19, 1860.

Dr. C. T. Jackson, Vice-President, in the Chair.

Dr. Brewer exhibited two nests of the humming-bird — one from Massachusetts, the other from Georgia.

It has long been a matter of doubt as to what is the material of which the nest is made. It is soft, white, cottony, homogeneous, and shingled on the outside with lichens; though evidently of vegetable origin, the precise material was not known. In the Massachusetts nest, it proves to be the down which protects the buds of the oak tree in spring, and in this instance of the red oak; in the Georgia nest it was of a coarser character, but probably obtained from a similar Southern oak.

He also exhibited two nests of the summer yellow-bird, one from the island of Grand Manan, the other from Lynn, Mass. The former was made almost entirely of the wool of sheep, many of which are kept on the island; the fabric is strengthened by a few straws. In this State the nest is usually made of soft flaxen fibres of decayed plants, and of cotton and threads; the nest exhibited was composed of the unusual material of the down of the brake.

Mr. C. H. Hitchcock made a communication on the geology of Vermont, chiefly in connection with the Taconic system.

The rocks above and below this system are essentially the same in Eastern Vermont and in New York; the first five or six in the series are exactly the same, commencing with the Laurentian deposits, and others above are a little different; the rock containing the trilobites of the Primordial fauna is the first which does not conform paleontologically to the New York arrangement; from the Lower Silurian to the Hudson River group all are found in Vermont, as also their junction one with the other; over the Hudson River slates at St. Albans, on Lake Champlain, lies the equivalent of the Oneida conglomerate, and over this the trilobitic rock. Emmons considers that there is a fault between this and the rocks to the east, in which Mr. Hitchcock differs from him, finding no evidence of its existence as far as the geological survey has yet been made; on the contrary, he finds the junction of the coarse grit and the overlying slates above the Hudson River group perfect. He drew a section from St. Albans, on the lake, eastward, showing the order of superposition of the rocks, which all have a small dip, not more than 20°, and the position in which the trilobites have been found. With regard to the *Olenus* discovered there, Prof. Hall is inclined to consider it as belonging to a new genus of trilobites.

In reply to a question as to the age of the Braintree rock containing *Paradoxides*, Prof. Rogers observed that the only indication was to be derived from the fossils and their comparison with the Primordial fauna of Bohemia. The age could not be certainly pronounced upon, without accepting as a principle in paleontology that fossils determine exactly the age of strata; this has many exceptions showing that the lines are not always precisely defined. He mentioned several instances in the Appalachian chain and elsewhere, where a mingling of fossils invalidates the law of their strict limitation to determined strata.

Mr. Marcou reiterated his belief in the supremacy of stratigraphy in paleontology. He regarded the instances cited by Prof. Rogers as exceptional, and as what occasionally is found the world over on the edges of a basin, where great disturbance has evidently taken place, mixing together fossils of different strata; but he denied that similar mixtures are ever found in the middle of a basin.

Dr. C. T. Jackson inquired if the *Paradoxides* of Braintree is the same as the *P. spinosus* of Bohemia.

Mr. Ordway replied that from the examination of a considerable number of specimens, he was satisfied that they are distinct species, and he would soon make to the Society a communication giving his reasons for this opinion.

Prof. Rogers stated that Barrande's means of solving this question were scanty, consisting of a few casts in Paris and some photographs sent by himself. Barrande thinks them the same; but if this opinion should be reversed on full examination, and the two be ascertained to be distinct species, or still better, strongly marked varieties, it would coincide well with his present views on the origin and modification of species.

A paper for publication in the Society's Journal was received from Prof. James Hall, entitled "Descriptions of New Species of *Crinoidea* and other Fossils from the Carboniferous Rocks of the Mississippi Valley." It was referred to the Committee on Publication.

Dr. C. T. Jackson presented some fossil shells from the coal formation at Chiriqui, which is of Eocene age and apparently equivalent to the Paris basin.

The thickness of this coal is about 73½ feet, of which 30 feet are so near together as to be worked in a single gallery. A broad belt of this coal extends through British Guiana and Costa Rica, the more southern portions having been examined by D'Orbigny, Darwin, Wheelwright and other French and English naturalists; the true coal series, however, has never been discovered in South America. This coal in quality is almost identical with cannel; in specimens analyzed from different localities, the carbon varied from 39 to 43½ per cent., the gas from 41½ to 48½, the water from 5 to 6, the ash from 6½ to 10, and the specific gravity from 1.316 to 1.341. In the elementary analysis of a specimen from Cultivation Creek, we have:

Carbon	68.018
Hydrogen	6.480
Oxygen	17.858
Nitrogen	.855
Sulphur	.189
Ashes	6.600
	100.000

A microscopic examination of this coal shows that it was formed from cellular and not from exogenous plants. Pope's Island coal resembles some varieties of lignite, but contains bitumen; its odor in burning is like that of amber. This coal burns like the cannel of Scotland, with an abundant yellow flame.

Mr. Robert Chambers, of Edinburgh, was elected a Corresponding Member, and Dr. C. F. Crehore, of Boston, and Mr. J. Haven Emerson, of Cambridge, Resident Members.

DONATIONS TO THE MUSEUM.

October 3, 1860. Several Hindoo skulls; skulls and separated cranial bones for anatomical study; and a finely shaped skull from the battle-field of Waterloo, on whose exterior were traced the lines of demarcation of the phrenological faculties by Spurzheim himself; by Dr. B. J. Jeffries. A specimen of coral (*Madrepora spicifera*) from the East Indies; by Dr. S. Kneeland, Jr.

October 17. The teeth of a ray (*Zygobatis*); by Dr. E. W. Blake. A hog-nosed snake (*Heterodon platyrhinos*), killed in Milton; by Master Fred. A. Gilmore.

November 7. A young salmon from Sebago Lake; by Mr. Walter M. Brackett. Eggs of loons and other marine birds, a large crab, large barnacles from the skin of whales, and specimens of *Mallotus villosus* and *Gasterosteus Cuvieri*, from Labrador; by Dr. H. Bryant. The following helminths, — *Tricocephalus dispar*, from a human subject in Vienna; *Trichina spiralis*, from pectoral muscles of man; *Filariæ*, immature, encysted in gluteal muscles of mandrill, which died in menagerie; *Cephalocotylean* worms from large intestine of *Odontaspis griseus*, undescribed; *Agamonema capsularia*, encysted in a coiled condition in the peritoneum of *Lophius Americanus; Eustrongylus gigas*, loose in peritoneal cavity of *Phoca vitulina; Ascarides* from stomach of *P. vitulina;* worms from pericardial surface of heart of *P. vitulina;* by Dr. J. C. White. *Tæniæ* from intestine of loon; by Mr. Edes. *Dibothrium latum*, 19½ feet long, from an Irishman in America; by Mr. N. C. Page. Skeleton of a Canada lynx; by Mr. F. L. Lee. The body of a female seal (*P. vitulina*), and a young flamingo; by Mr. J. A. Cutting. Vertebræ of blue fish; by Dr. S. Kneeland, Jr.

November 21. A halcyonoid polyp of the family *Gorgonidæ*, from the Bay of Fundy; by Mr. Lemuel Moore. A myriapod (*Iulus*) from Memphremagog lake; by Mr. C. A. Browne.

December 5. 241 species of shells of the Indo-Pacific fauna; by the Smithsonian Institution. A collection of minerals, chiefly ores of iron, from Nova Scotia; by Mr. George W. Busteed. A large stuffed head of a moose, with fine pair of horns; by Drs. Durkee, Bacon, and Sprague, and Messrs. Binney, Ross, and Rogers.

December 19. Embryonic ray from San Francisco, Cal., probably *Raia oculata* (Girard); by Dr. C. F. Winslow. Cast of the head of a Flathead Indian; by Dr. S. Durkee. A cuttle fish (*Onychoteuthis*) from the Mediteranean; by Mr. Lot Day. A sea swallow (*Dactylopterus volitans*, Cuv.) from New Bedford; by Mr. W. H. Taylor. Specimens of Chinese caterpillar (*Sphæria Sinensis*); by Mr. William F. Gragg.

BOOKS RECEIVED DURING THE QUARTER ENDING DEC. 31, 1860.

Observations on the Genus Unio. By Isaac Lea, LL.D. Vol. VIII. Part 1. 4to. Philadelphia. *From the Author.*

Conspectus Generum Avium. Auctore C. L. Bonaparte. Tom. 2. 8vo. Lugduni Batavorun, 1857. *From Dr. H. Bryant.*

Report on the State House Well (Columbus, O.). By J. S. Newberry. 8vo. Pamph. 1860. *From the Author.*

Address before the Essex Agricultural Society. By John L. Russell. 8vo. Pamph. Newburyport, 1860. *From the Author.*

Minnesota: its place among the States. Being the First Annual Report of the Commissioner of Statistics, for the year ending January 1st, 1860. Published by Authority of Law. 8vo. Pamph. pp. 176. Hartford, 1860. *From Dr. S. Kneeland, Jr.*

Chart of Geological Formations. By James Hall. 4to. Folded. Also Key to Chart. 12mo. Boston, 1852. *From Dr. S. Durkee.*

Chicago Sewerage. 8vo. Pamph. 1858.

Report of Sewerage Commissioners of Chicago. 8vo. Pamph. 1860. *From Dr. S. A. Green.*

Rock Oils of Ohio. By J. S. Newberry. 8vo. Pamph. 1859. *From the Author.*

Life beneath the Waters. By Arthur M. Edwards. 12mo. N. York, 1860. *From the Author.*

Geological Survey of Canada. 8vo. Pamph. Montreal, 1859.

Über die Wohnsitze der Brachiopoden. Von Prof. Edward Suess. Nos. 1, 2. 8vo. Pamph. Wien, 1859. *From Dr. A. A. Gould.*

Proceedings of the Twenty-First Annual Meeting of the Vermont Historical Society. By Joseph Torrey. 8vo. Pamph. Burlington, 1860.

Experiments and Inferences in regard to Binocular Vision. By Prof. Wm. B. Rogers. 8vo. Pamph. New Haven, 1860. *From the Author.*

Histoire Naturelle des Oiseaux. Par le Comte de Buffon. 18 vols. 24mo. Paris, 1770–1785. *From Dr. Henry A. Ward.*

Catalogue of Flowering Plants and Ferns of Ohio. By J. S. Newberry, M. D. 8vo. Pamph. Columbus, 1860. *From the Author.*

Edinburgh New Philosophical Journal. Vol. XII. No. 1. July, 1860. 8vo. Edinburgh. *From Prof. H. D. Rogers.*

Catalogue of the Publications of Societies in the Library of the Smithsonian Institution; also of the Lepidoptera of North America; also of the Diptera of North America. *From the Smithsonian Institution.*

Transactions of the Middlesex Agricultural Society for 1860. 8vo. Concord, 1860. *From H. D. Thoreau.*

Synonymy of the Family Cyclades. By Temple Prime. 8vo. Pamph. 1860.

Synonymy of the Species of Cyrenella. By the Same. 8vo. Pamph. Also Description of two species of Genus Batissa. By the Same. 8vo. Pamph. 1859. *From the Author.*

Transactions of the Academy of Science of St. Louis. Vol. I. No. 1. 8vo. 1857.

Boston Journal of Philosophy and Arts. No. 2. 8vo. 1823. *From Dr. B. J. Jeffries.*

Descriptions of New Cretaceous Shells from Texas. By B. F. Shumard, M. D. 8vo. Pamph.

Observations upon the Cretaceous Strata of Texas. By the Same. 8vo. Pamph. *From the Author.*

Observations on the Sea- or Pile-Worms. By Mr. Rousset. 8vo. Pamph. London, 1733.

On the Correlation of Physical Forces. By W. R. Grove, F.R.S., &c. 8vo. Pamph. London, 1846. *From Dr. B. S. Shaw.*

Gassies, J. B. Tableau Méthodique et Descriptif des Mollusques Terrestres et d'Eau douce. 8vo. Pamph. Paris, 1849.

Catalogue Raisonné des Mollusques Terrestres et d'Eau douce de la Gironde. Par J. B. Gassies. 8vo. Pamph. Paris, 1859. *From the Author.*

Jahrbuch der K.-K. Geologischen Reichsanstalt. 1859. X. Jahrgang. Nos. 3, 4. Juli. — December. 8vo. Wien.

Archiv für Naturgeschichte. Wiegmann. Erichson. Sechstes Heft: 25 Jahrgang. Erstes Heft: 26 Jahrgang. 8vo. Berlin, 1859–60.

Proceedings of the Zoölogical Society of London. Parts 1–3. 8vo. London, 1859-60.

Bulletin de la Société de Géographie. 4e Série. Tome XIX. 8vo. Paris, 1860.

Mémoires de l'Académie Impériale des Sciences, &c., de Lyon. Classe des Sciences. Tomes VIII. and IX. 8vo. Lyon, 1858–9.

Classe des Lettres. Nouvelle Série. Tome VII. 1858–9.

Proceedings of the Academy of Natural Sciences of Philadelphia. Sigs. 29–35. 1860.

Transactions of the Academy of Science of St. Louis. Vol. I. No. 4. 8vo. 1860.

Proceedings of the Essex Institute. Vol. II. Part 2. 1857 to 1859. 8vo. Salem, 1860.

Annual Report of the Board of Regents of the Smithsonian Institution. 8vo. Washington, 1860.

Verhandlungen der K.-K. Zoölogisch-botanischen Gesellschaft in Wien. Jahrgang, 1859.

Nachrichten von der G. A. Universität und der K. Gesellschaft der Wissenchaften zu Göttingen. 1859. Nos. 1–20. Nebst Register. 12mo. Göttingen.

Achter Bericht der Oberhessischen Gesellschaft für Natur-und Heilkunde. 8vo. Giessen, 1860.

Denkschriften der K. Akademie der Wissenschaften. Math.-Naturw. Classe. 4to. Vol. XVIII. Wien.

Sitzungsberichte. Math.-Naturw. Classe. 1860. 3–5, 7, 8, 10.

Naturforschende Gesellschaft in Emden. Jahresbericht für 1859.

Kleine Schriften. VI. VII. 4to. Pamph.

Bulletin de l'Académie Impériale des Sciences de St. Pétersbourg. Tome I. Feuilles 10–36. 4to. 1860.

Mémoires de l'Académie Impériale des Sciences de St. Pétersbourg. Tome II. Nos. 1, 2, 3. 4to. 1859.

Actes de l'Académie Impériale des Sciences, Belles Lettres, et Arts de Bordeaux. 3e Série. 21e Année. 1859. 4e Trimestre. 8vo. Paris.

Journal of the Royal Geographical Society. Vol. XXIX. 1859. 8vo. London.

Proceedings of the Royal Geographical Society. Vol. IV. Nos. 2, 3. 1860.

Proceedings of the Royal Physical Society of Edinburgh. 1854–8. 8vo. Vol. I.

Memoirs of the Literary and Philosophical Society of Manchester. Vol. XV. 2d Series. 8vo. London, 1860.

Transactions of the Philosophical Institute of Victoria. Vol. IV. Part 1. Melbourne, 1859.

Proceedings of the Geological and Polytechnic Society of the West Riding of Yorkshire. 1859. 8vo. Pamph. Leeds.

Leeds Philosophical and Literary Society. Annual Report for 1859–60. 8vo. Pamph.

Physical Condition of the People, &c. By R. Bickersteth. 8vo. Pamph. 1860.

Sensorial Vision. By J. F. W. Herschel. 8vo. Pamph. 1860.

Canadian Journal of Industry, Science, and Art. No. 29, for September, 1860. 8vo. Toronto.

Actes de l'Académie Impériale des Sciences, &c. de Bordeaux. 3e Série. 22e Année. 1860. 2e Trimestre. 8vo. Pamph. Paris, 1860.

Der Zoölogische Garten. Nos. 7–12. 8vo. Pamph. 1860. I. Jahrgang.

Canadian Naturalist and Geologist. Vol. V. No. 5, for October, 1860. Montreal.

Silliman's American Journal of Science and Arts. Vol. XXX. No. 90, for November, 1860. New Haven.

Proceedings of the Academy of Natural Sciences of Philadelphia. Sigs. 25–28. for 1860.

Actes de la Société Linnéenne de Bordeaux. Tome XXII. 3e Série. Tome II. 8vo. 1860.

Proceedings of the Literary and Philosophical Society of Liverpool. No. XIV. 8vo. 1860.

Bulletin de la Société Paléontologique de Belgique. I. Feuilles, Nos. 4, 5. 8vo. Anvers. Pamph. 1860. *Received in Exchange.*

Quarterly Journal of the Geological Society. No. 64, for November, 1860. 8vo. London.

Règne Animal disposé en Tableaux Méthodiques. Par J. Achille Comte. 87 plates. Elephant folio. Paris, 1840.

Annals and Magazine of Natural History. Vol. V. No. 34 for October, and No. 35 for November, 1860. 8vo. London.

Contributions to the Natural History of the United States of America. By Louis Agassiz. Vol. III. 4to. Boston, 1860. *From the Courtis Fund.*

Result of Researches among the British Archives, relative to the Founders of New England. By Samuel G. Drake. 4to. Boston. 1860. *Deposited by the Republican Institution.*

INDEX TO VOL. VII.

N. B. New genera and species are in *italics*.

ERRATA.

Page 186 line 12, for *Hentzii* read *Heutzii*.
" 204 " 22, " *Rusei* " *Rüsei*.
" " " 28, " *Ethiops* " *Æthiops*.
" 349 " 20, " *marmorata* read *ringvia*. Brün.